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ABSTRACT

A study identified cognitive styles (as measured by field independence/dependence, FI/D) of 21 Japanese students in two American high schools, in comparison with 63 white-American students. It examined how cognitive styles may relate to academic achievement (as measured by grade point average (GPA) and test scores), gender, and number of years in American schools. It was hypothesized that Japanese students are field independent with no significant differences from white Americans, and that FI has a significant, positive correlation with math achievement but not with verbal achievement or years in American schools. The Group Embedded Figures Test (GEFT) was administered as a measure of FI/D, and hypotheses tested statistically. Results show the Japanese students were highly FI and that their GEFT scores were significantly higher than those of white American students. No significant gender differences in GEFT were found within each group. No significant correlations were found between GEFT and academic achievement or number of years in American schools among Japanese students. However, significant gender and culture differences were found in the two groups' achievement patterns. (Author/MSE)

A STUDY OF FIELD-INDEPENDENT/FIELD-DEPENDENT COGNITIVE STYLES OF JAPANESE STUDENTS AND CORRELATIONS WITH THEIR ACADEMIC ACHIEVEMENT IN TWO AMERICAN HIGH SCHOOLS

by

Setsuko Buckley

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Cognitive Styles of Japanese Students and Correlations
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by Setsuko Buckley

Chairperson of the Supervisory Committee: Prof. James Vasquez
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This study identified cognitive styles (as measured by field independence/dependence - FI/D) of 21 Japanese students in two American high schools, in comparison with 63 white-American students. It examined how cognitive styles of Japanese students may relate to their academic achievement (as measured by GPA, MAT, and Competence Test scores), gender, and number of years in American schools.

It was hypothesized that Japanese students are FI with no significant differences from white-Americans. It was further hypothesized that FI has a significant, positive correlation with math achievement, but not with either verbal achievement or number of years in American schools. The Group Embedded Figures Test (GEFT) was administered as a measure of FI/D. Hypotheses were tested using the one-tailed t-test and the Spearman correlation coefficients at the .05 level of significance.

Results show that Japanese students are highly FI and that their GEFT scores are significantly higher ($p = .013$) than those of white-American students. No significant gender differences in GEFT were found within each group. No significant correlations were found between GEFT and academic

achievement or number of years in American schools among Japanese students. However, significant gender and culture differences were found in the achievement patterns in the two groups. No significant differences in GPA, math, and English were found among males, while a significant difference in GPA and math was found among females. Japanese females score higher than Japanese males in GPA, math, and English. These findings can help educators develop instructional strategies based on the FI cognitive style, especially in math classes, for language minority students who do not do well in school.

Doctoral Dissertation

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Date August 10, 1992

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CHAPTER I. INTRODUCTION

1. Statement of Problem

American students' problems of academic achievement have been of increasingly greater concern among educators in the United States. Several studies have shown a decline of achievement test scores in secondary schools (Fey & Sonnabend, 1982; National Commission on Excellence in Education, 1983). Standardized tests have been used for many testing programs since the late 1960's. Braswell (1978) reported on average SAT scores for high school seniors that "During the fourteen year period since 1963, there has been a forty-nine-point drop in the mean verbal score and a thirty-one-point drop in the mean mathematical score." (p. 173). NACOME (1975) also reported that "Declines in mathematics K-12 have almost always been accompanied by comparable declines in the reading and language skills performance of the same students." (p. 145). In addition, Fey (1982) mentioned that "The National Assessment of Educational Progress (NAEP) mathematical data confirm longer trends of declining achievement, particularly in upper grades and secondary school. However, the detailed description of varying achievement patterns and trends in specific topic areas suggested that a simple causal explanation is unlikely to be found." (p. 146). Thus, various achievement patterns in both verbal and mathematical abilities need to be explained.

Several researchers have attempted to explain this decline in achievement scores. One of the main reasons may be the changes in the types of students taking standardized tests in secondary schools (Evangelauf & Jacobson, 1986). More students from low socioeconomic family backgrounds, minority students, and women are taking these tests. A large number of studies have been conducted to examine minority academic achievement and its cultural explanations (Ogbu, 1982, 1983, 1986, 1987a, b; Erickson, 1987; Trueba, 1986, 1988). Several studies showed that language and cultural differences influence cognitive styles and that differences in cognitive styles may impact on students' academic achievement (Cohen, 1969; Ramirez and Castaneda, 1974).

Witkin (1954) first suggested that cognitive style is an important variable as a major component of psychological differentiation. Witkin suggested that the concept of differentiation relates to the differentiation of personality such as social behavior, body concept, and self-consciousness. He found that cognitive style relates to both cognitive performance and social behavior in the classroom. He regarded social behavior as part of personality, as reflected by variables such as gender, age, cultural background, and socioeconomic status. Thus, it was predicted that academic achievement patterns may relate to these demographic variables which may impact on cognitive styles.

Furthermore, Kogan (1976a) addressed the relationship

between cognitive styles and academic achievement. His research on cognitive styles was particularly focused on individual differences in the intellectual functioning of school-age children and their implications for academic achievement. He also mentioned that there are individual differences in preference in modes of perceptual and intellectual organization of the surrounding world and that these individual differences relate to cognition and personality. Integrating intellectual and psychological functioning, he emphasized developmental aspects of cognitive styles.

In cross-cultural studies on cognitive styles, Banks (1988) mentioned that "Theorists and researchers who support the cultural difference hypothesis, have been heavily influenced by the cognitive style concept pioneered by Witkin" (p. 458). Furthermore, DeVos (1980) found that "differences in cultural backgrounds produce differences in both cognitive patterns and forms of social interaction" (p. 112). Thus, it is understood that cognitive styles are significantly associated with cultural backgrounds and socialization as well as academic achievement. A number of studies have investigated how cognitive styles of particular minority groups who do not do well may relate to their academic achievement. Its theoretical explanations have been done (Ramirez & Castaneda, 1974; Ogbu, 1982, 1983, 1987a, b; Saracho, 1983; Banks, 1988). However, few studies have been

conducted to examine cognitive styles of the particular minority groups who do well in school (Wong, 1980; Matute-Bianchi, 1986). In the current American educational system, American students, in comparison to Japanese and East Asian students, do not do as well on math. For example, Peng, Owings and Fetters (1984) and Tsang (1988) reported that "the mathematics achievement of Asian Americans in secondary school is higher than that of Anglo American students." In addition, in cross- national studies, primarily done in junior and senior high schools, Stigler et al. (1982) and Husen (1983) found that math achievement test scores in the United States are significantly lower than comparable scores in other countries such as Japan and Taiwan.

Thus, it is meaningful to study cognitive styles of Japanese students in American schools with regard to their academic achievement. Furthermore, it is meaningful to investigate how cognitive styles of Japanese students may relate to their own cultural backgrounds and new cultural experiences in the United States and how their achievement patterns in math and verbal abilities may be different from those of white-American students. It could be beneficial for American educators to investigate how cognitive styles of particular minority groups who do well in school, even though foreign-born, may relate to their academic success in the cultural setting which is different from their own.

2. Purpose of the Study

The purpose of the study was (a) to identify cognitive styles (as measured by field independence/dependence - FI/D) of Japanese students (male and female) in two American high schools, (b) to investigate how their cognitive styles may relate to their academic achievement as measured by GPA, MAT, and Competence Test scores, (c) to further investigate how their cognitive styles may relate to gender and number of years in American schools, and (d) to examine if there is any cross- correlation between the above variables. The research was also aimed at comparing cognitive styles of Japanese students with those of white-American students in regard to academic achievement and gender.

Japanese culture is very different from American culture in that the roles of males and females are more distinctive. Because of culture differences, there may be differences in child-rearing and socialization between male and female children. Thus, gender is an important variable, possibly affecting the relationship between the FI/D cognitive styles and academic achievement. Witkin and his colleagues found the developmental characteristics of the FI/D cognitive styles. Thus, gender differences in biological development with age changes may relate to cognitive and psychological development.

In addition, number of years in American schools is also an important variable, indicating the degree to which Japanese students adjust to the American culture over time and the

relation of this factor to academic achievement. However, Witkin found cognitive styles to be consistent and stable in one cultural group. Thus, it is meaningful to study the relationship between cognitive styles of Japanese students and number of years in American schools to learn whether their cognitive styles may change according to their time in American schools. An increase in number of years in American schools may indicate the development of verbal (English) abilities. Thus, it is also meaningful to investigate the degree to which cognitive styles of Japanese students may relate to their developed verbal (English) abilities as well as mathematical abilities.

This cross-cultural study will provide a possible cultural explanation of the degree to which Japanese students' academic achievement may be associated with their cognitive styles. To identify cognitive styles of Japanese students who do well in school will help educators identify positive traits for learning and academic success. Furthermore, to identify how their identified cognitive styles may relate to academic achievement, gender, and number of years in American schools will provide educators with implications for education and human development, such as how those cognitive styles interact with instructional styles, methods, and environments to affect academic achievement.

CHAPTER II. LITERATURE REVIEW

1. Related Research

The term "Cognitive style" as a major component of psychological differentiation has been introduced and conceptualized in the psychological literature during the past forty years. The concept of cognitive style, particularly known as field-independence/dependence (FI/D), has been pioneered and developed by Witkin and his colleagues (Witkin, 1967; Witkin and Berry, 1975; Berry, 1976; Witkin, Moore, Goodenough, & Cox, 1977b; Witkin and Goodenough, 1981).

Many researchers have defined various facets of cognitive style which may account for individual differences. The psychological term "cognitive style" is defined as "the characteristic self-consistent modes of functioning found pervasively throughout an individual's cognition, that is, perceptual and intellectual abilities" (p. 234, Witkin, 1967).

Cognitive style is also defined as "a wide range of stylistic behavioral characteristics which describe the functional modes of an individual's perceptual and intellectual experiences" (p. 3, Saracho, 1983). Furthermore, it is defined as "characteristic self-consistencies in information processing that develop in congenial ways around underlying personality trends" (p. 61, Messick, 1984). These statements show that cognitive style is strongly associated with perceptual, intellectual, and psychological functioning

(as conceived of personality). This indicates that differences in perceptual, intellectual, and psychological functioning influence cognitive performance.

As a more specific aspect of cognitive style, Witkin formulated the construct, field-independence/dependence. Witkin defined field-independence (FI) as the individuals whose perception is independent of the surrounding visual framework. While he defined field-dependence (FD) as the individuals whose perception is heavily dependent on it. Witkin found that FI indicates a high degree of psychological differentiation; while the FD characteristics are considered as less differentiated and as related to social interaction and integration.

In the broader term, cognitive style, including cross-cultural contexts, is defined as "the result of the value-determined socialization of a given group of people" (p. 60, Ramirez and Castaneda; 1974). Socialization refers to a degree of separation of a variety of psychological areas such as modes of perceiving and thinking. Children experience socialization through their family and peers as a means of understanding their surrounding world. Furthermore, Witkin et al. (1975) mentioned that "One may conclude that ethnic groups are likely to display a general tendency towards a differentiated or integrated cognitive style" (p. 4). Thus, socialization which varies in different cultures may influence cognitive styles. Saracho (1989b) reviewed Witkin, Moore,

Goodenough & Cox (1977) and summarized that "These differences (of individuals who react to the situations in which they find themselves) are a component of cognitive style such as perceptual modes, personality, intelligence, and social behavior" (p. 75). The above statements showed that there are cultural variations in cognitive styles and that genetic and socialization factors influenced by cultural backgrounds are involved in cognitive styles. These assumptions may be important in cross-cultural studies. Socialization may be characterized by a structure of child-rearing. Witkin (1962) found that mothers of FI children provide more differentiating experiences and create distance between themselves and their children more frequently than mothers of FD children. Furthermore, Ramirez and Castaneda (1974) mentioned gender differences in child-rearing. Greater emphasis is on nutrient, responsibility, and obedience for females, and on achievement and self-reliance for males.

In addition, Cohen (1969) pointed out that socioeconomic factors related to socialization. Thus, social class became an important variable in examining the relationship between cognitive style and socialization. Some researchers found that middle-class groups are more analytic, reflective, and FI (Kagan and Kogan, 1970; Sigel, 1971).

Thus, cross-cultural inquiry about socialization and child-rearing is essential to finding the origins of particular cognitive styles. DeVos (1980) mentioned that

white-American children experience socialization separated from parents. Because of this they learn individualization and become perceptually independent. Consequently, white-American children appear to be FI. While DeVos (1980) reviewed Werner (1979) and found that most minorities cognitive styles can be recognized in social settings characterized by tight, authoritative social structure and the use of strict practice to insist social integration. Under these circumstances, emphasis is on respect for authority, close ties to the mother, a formal relationship with the father, and emphasis on loyalty to the family. Consequently, most minority children appear to be FD. Witkin also compared cognitive styles of minority students with those of white-American and European children, stating the difference between a tight society and a loose society. He mentioned that in a tight society roles are highly organized into hierarchy. In contrast, in the loose society such as the Western society, individual's independent behaviors are encouraged, and because of this socialization factors contribute to the development of differentiation.

Although the Japanese society is hierarchical and traditional, DeVos (1980) pointed out that "Very strong ego boundaries are established and there is a high degree of internality among Japanese..." (p. 112). His statement shows that cognitive style of Japanese children may not be similar to those of minority children, because of the differences in

socialization and child-rearing.

Integrating cognitive and psychological variables with regard to cultural backgrounds, a large number of studies have been conducted. Messick (1970, 1976, and 1984) attempted to conceptualize and integrate various continued research on cognitive styles. Messick (1970) categorized cognitive style into nine dimensions in the "Cognitive-Dimensions Model". Those are (1) FI versus FD; (2) reflective versus impulsive; (3) scanning; (4) breadth of categorizing; (5) conceptualizing style; (6) complex versus simple (in cognition); (7) leveler versus sharpener; (8) distractibility; and (9) tolerance for unrealistic experiences. The FI/D dimension has been most thoroughly researched during the past forty years.

Kogan (1976a) also categorized cognitive styles into three types in terms of the functional distance of the style, relating to intellectual functioning. First, cognitive style refers to an ability to perform. He found that the FI individual is able to discover simple figures within a complicated figure better than the FD individual. It means that FI persons are more accurate than FD persons in performance as measured by disembedding figures. Second, cognitive style refers to ability in processing information about the surrounding world. He found that the complicated individual has more advantage than the simple individual, because the former is more reflective. Third, cognitive style is a mode of stylistic preference rather than an ability to

perform.

Saracho (1989b) reviewed Kogan's summary (1971) on the FI/D dimension: "FI versus FD: an analytical versus global way of perceiving (which) entails a tendency to experience items as discrete from their backgrounds and reflects ability to overcome the influence of an embedding context" (p. 76). Global and analytical dimension is significantly associated with intellectual and psychological differentiation.

Several studies on problem-solving categorized the analytical person's cognitive style as analytic, trial-and-error, and comfort with well-discriminated items. In contrast, the global-oriented person tends to be comfortable with information about the overall situation with a few specifics and less well-defined approach to problem-solving (Witkin et. al., 1962; Messick, 1976). Messick (1976) summarized the characteristics of analytical and global dimension such that "The FI pole includes competence in analytical functioning, combined with an impersonal orientation, while the FD pole reflects correspondingly less competence in analytical function combined with greater social orientation and social skills" (p. 14). Furthermore, Gordon (1967) mentioned that analytical versus global cognitive style in children as a function of age, gender, and intelligence is equivalent to FI versus FD in the same conditions.

In the psychological dimension of cognitive style, Saracho (1984) reviewed Witkin (1974), then summarized that

"FD individuals usually rely on the surrounding field, depend on authority, observe the faces of those around them for information, prefer to be with people and experience their environment in a relatively global fashion as they conform to the prevailing field or context" (p. 44). Saracho also stated that "FI persons tend to be able to abstract elements from the surrounding field and to solve problems identifying critical elements out of context, remaining socially detached, independent of authority, and analytic" (p. 44). He concluded that FI persons have more advantages than FD persons in logical thinking and problem-solving skills. FD individuals appear to be consistent with a social interactional style in which the individual is more sensitive to both positive and negative social cues. In contrast, FI individuals are more independent in decision-making and more competitive in social interaction.

As stated above, it is understood that FI is distinct from FD in perceptual, intellectual, and psychological characteristics. Witkin, Goodenough, and Karp (1967) found that these stylistic characteristics are highly consistent and stable over time. It means that there is an individual consistency in perceptual functioning from childhood to young adulthood and that perceptual performance within the context of developmental changes has relative stability. In addition, Witkin et al. (1977b) stated that the major characteristics of cognitive styles are the form rather than the content of

cognitive activity. They also stated that cognitive styles are bipolar rather than positive and negative traits in learning. The distinction of the characteristics between FI and FD can be summarized in Tables 1 and 2.

TABLE 1: Cognitive Styles

Psycho-socio behavior	Integrated Style	Differentiated Style
Perceptual	Field sensitivity(2) Field dependence(3)	Field independence(2)
Body Concept	Global(3)	Articulated(3)
Incentive/ Motivational	Cooperative(2) Personal(2) Dependent on Authority(3)	Competitive(2) Impersonal(2) Independent(3)
Human Relations	Cooperative(2) Personal(2)	Competitive(2) Impersonal(3)
Vocational Preference	Prefer helping, social professions(4)	Prefer impersonal, specialized professions, artistic(4)
Learning Style	Modeled/deductive(2) Relational(4) Poor on standardized tests(1)	Independent/ inductive(2) Analytical(4) Favored by standardized tests(1)
Socialization style	Dominant mother(3) Dependence(2) Rule-regulated(3) Severe discipline(3) Traditional(2)	Autonomous mother(3) Independence(2) Self-direction(3) Self-discipline(3) Modern, assimilated(2)

(1) Cohen, 1969
(2) Ramirez and Castaneda, 1974
(3) Witkin et al., 1962
(4) Witkin et al., 1975

(p. 2, Spangler, 1982)

TABLE 2: Learning Styles

Field-Dependent	Field-Independent
perceives globally	perceives analytically
experiences in a global fashion, adheres to structures as given	experiences in an articulate fashion, imposes structure or restrictions
makes broad general distinctions among concepts sees relationships	makes specific concept distinctions, little overlap
social orientation learns material with social content best	impersonal orientation interested in new concepts for their own sake
attends best to material relevant to own experience	learns social material only as an intentional task
requires externally defined goals and reinforcements	has self-defined goals and reinforcements
needs organization provided	can self-structure situations
more affected by criticism	less affected by criticism
uses spectator approach for concept attainment	uses hypothesis-testing approach to attain concepts

(p. 10, Garger & Guid, 1984)

Many longitudinal studies have been conducted to conceptualize how FI/D cognitive styles are related to perceptual, intellectual, and psychological functioning. Early studies focused on perceptual functioning. Then the focus was shifted into intellectual and psychological functioning.

Perception was an important concept in describing individual differences in Witkin's early studies on cognitive styles. Witkin and his colleagues found that there were

individual differences in perception and that the extent of differentiation was reflected in the degree of FI and FD. Thus, individual differences in perception were examined by the extensive use of the FI/D cognitive styles in a variety of psychological areas.

Witkin and his colleagues found three perceptual assessment procedures as the measures of the FD/I cognitive styles. Their earliest work on perceptual style was to assess how people orient themselves in a disorganized world. The Body-Adjustment Test (BAT) (Witkin, 1948, 1949) measured whether the subject could adjust the tilt of his chair to the true vertical position, while looking into a small tilted room. The most widely used early test, the Rod-and-Frame Test (RFT) (Witkin, 1948) measured whether the subject could adjust a rod seen within a rectangular frame, each tilted away from the true vertical, until it seemed to him to be vertical. Both tests were concerned with the ability to maintain oneself toward the upright in space.

An alternative measure, developed by Witkin (1950), is the Embedded Figures Test (EFT). EFT is an individually administered test for use with subjects, ranging in age from ten-years to college students. EFT was designed to assess perceptual disembedding in the FI/D dimension. This indicates that EFT attempted to assess the ability to break up an organized visual field in order to keep a part of it separate from that field. This test requires the subject to locate

simple geometric shapes within complex figures. Thus, EFT has been found to correlate with general visualization ability (Vernon, 1972). EFT is much easier to administer, because this is a paper-and-pencil test, while BAT and RFT require the more complicated equipment in the lab.

Although EFT is more convenient to administer than the other two tests, its task is similar to BAT and RFT. In addition, individual differences in perceptual functioning were found across three test scores in which higher scores indicate more FI, and lower scores indicate more FD. Thus, a significant high consistency was found in the subject's mode of cognitive performance and the test scores on these three tests.

In many studies, EFT was proved to have high reliability for ten-year olds to college students (Witkin et al., 1954, 1962; Karp, 1963).

As shown in Table 3, Witkin's manual (1971) presented norms of means and standard deviation of EFT scores for children in six age groups. EFT was administered to a number of different age and gender groups, ranging from ten through college students, and various kinds of groups, such as students in particular majors, various occupational groups, and pathological groups.

TABLE 3: Norms of Means and Standard Deviations for EFT Scores of Children in Six Age Groups

Age Level	Sex	N	Mean (Sec/item)	SD
10	M	51	117.9	32.9
	F	52	126.9	30.1
11	M	21	93.3	30.1
	F	24	111.8	31.6
12	M	25	94.8	35.6
	F	25	105.1	30.8
13	M	26	59.3	23.8
	F	25	73.4	37.9
15	M	25	34.6	30.5
	F	25	47.4	22.8
17	M	25	32.0	25.7
	F	25	50.4	26.9

Note: All these data for the 12-figure, 3-minute form were obtained by recomputing scores for the tests given in the original 24-figure, 5-minute form. These data show sex differences throughout the age range considered, a characteristic finding in numerous studies. The resulting value, which is the mean solution time per item, is the subject's score for the test.

(p. 18, Witkin, 1971)
The data are based on Witkin et al., (1962)

As shown in Table 4, Witkin (1971) demonstrated high reliability for EFT, especially among young adulthood and males. Kogan (1976) also demonstrated in his study on school children that sex interacts with age. In measuring FI/D, Witkin, in his early work, found that males tend to be more FI than females and that older people are more FI than young people. These characteristics are distinctive in young adulthood. His longitudinal studies showed that there is a

significant relationship between the FI/D cognitive styles and gender differences.

TABLE 4: Reliability Data for EFT Scores of Children in Six Age Groups

Age level	Sex	N	Reliability
10	M	51	.86
	F	52	.81
11	M	21	.84
	F	24	.74
12	M	25	.78
	F	25	.74
13	M	26	.61
	F	25	.85
15	M	25	.92
	F	25	.74
17	M	23	.84
	F	25	.61

Note: Reliability for the 12-figure, 3-minute format is all based on data obtained by recomputing scores for tests given in the original full 24-figure, 5-minute form.

(p. 19, Witkin, 1971)

EFT also was proved to have high validity for the above age groups. Cohen (1957), in his factor-analytic studies, identified three main factors in both the Wechsler Adult Intelligence Scale (WAIS) and the Wechsler Intelligence Scale for Children (WISC). These three factors are (a) a verbal-comprehension factor, (b) an attention-conception factor, and (c) an analytic factor. BAT, RFT, and EFT are only related to this third factor, that is, the ability to

overcome an embedded figure. His studies proved that EFT scores are related to the scores of other perceptual tests which require disembedding ability. His factor-analytic studies also found that EFT does not relate or only slightly relates to scores of tests which do not require disembedding ability, such as a test which measures verbal ability. This means that disembedding ability may be independent of verbal ability (Witkin, 1962; Goodenough & Karp, 1961, 1963).

Furthermore, a number of studies proved that disembedding studies proved that disembedding ability in EFT is associated with more differentiated functioning in other psychological areas, such as social behavior, the nature of the body concept, and differences in family and cultural backgrounds (Witkin, 1954, 1962; Berry, 1976; Dyk & Witkin, 1965). The studies proved construct validity for EFT as the measure of an individual's psychological differentiation.

Since EFT was too difficult for most children below the age of nine, the Children's Embedded Figures Test (CEFT) was developed by Goodenough and Eagle (1963), as modification of EFT. CEFT is also individually administered and used with subjects, ranging from five to ten years of age. Another alternative was the Group Embedded Figures Test (GEFT). GEFT, developed by Witkin, Oltman, Raskin, and Karp (1971), is a group-administered test and its format is very similar to EFT. Because of this, GEFT can be administered if an individual EFT test is inappropriate.

As shown in Table 5, the norms of GEFT are based on male and female college students from an eastern liberal arts college. As with EFT, gender differences were found. The scores of male students were slightly but significantly higher than females. This means that males tend to be more FI than females. Individual variability within each group was also found, especially with younger children. It should be noted that the differences in means between males and females are quite small compared to the range of scores within each gender. As shown in Table 6, correlations of .82 and .63 between scores of these GEFT and EFT were found by Witkin et al. (1971). A reasonably high correlation was found between GEFT and EFT, particularly for men. Split-half reliability of GEFT was .88. Messick (1976) stated the reason for gender differences in FI/D cognitive style as "Men tend to exhibit interests in areas referring analytic skills (technical and mathematical activities), women tend to prefer activities that involve dealing with people" (p. 53). This general trend may relate to socialization practices and child-rearing in early childhood reflected by the particular culture.

TABLE 5: Preliminary Norms of Number Correct as Quartiles for GEFT Score of Men and Women College Students

Quartiles	Men	Women
1	0 - 9	0 - 8
2	10 - 12	9 - 11
3	13 - 15	12 - 14
4	16 - 18	15 - 18
N	155	242
Mean	12.0	10.8
S. D.	4.1	4.2

TTL N : 397
Mean : 11.27

(p. 28, Witkin, 1971)

It was demonstrated that the FI/D cognitive styles as perceptual functioning were measured by RFT, BAT, EFT, CEFT, and GEFT, according to age groups and number of subjects. These tests proved to have a high consistency and validity on the mode of cognitive performance and the test scores. Disembedding simple figures from complicated figures implies symbolical representation in problem-solving tasks that the subject has to deal with. Thus, EFT, which assesses perceptual disembedding may reflect the extent of performing analytical ability. In other words, FI is significantly related to ability to solve problems correctly.

Thus, Witkin and his colleagues did not limit the FI/D construct to a subject's perception, but broadened its domain into intellectual functioning which specifically relates to analytical ability.

TABLE 6: Validity Coefficients of the Correlations between GEFT and EFT, PRFT, and ABC Scores

Population	N	Criterion Variable	r with GEFT score*
Male Undergraduates	73	Individual EFT, solution time	-.82
Female undergraduates	68	Individual EFT, solution time	-.63
Male undergraduates	55	PRFT, error	-.39
Female undergraduates	68	PRFT, error	-.34
Male undergraduates	55	ABC, degree of body articulation	-.71
Female undergraduates	68	ABC, degree of body articulation	-.55

*r's with EFT or PRFT (RFT with the portable apparatus) should be negative because the tests are scored in reverse fashion.

ABC = Articulation of the Body Concept

(p. 29, Witkin, 1971)

Therefore, intellectual functioning in the FI/D cognitive styles became an important domain in describing individual differences in modes of thinking.

A number of studies have been conducted to conceptualize how cognitive styles differ from intelligence or cognitive abilities. Goldstein and Blackman (1978) reviewed Suedfeld (1971) and found that "Common to all theory and research on cognitive style is an emphasis on the structure rather than the content of thought... (It) refers to the ways in which individuals conceptually organize their environments" (p. 3).

As stated before, cognitive style was defined as "characteristic self-consistencies in information-processing" (Messick, 1984). Furthermore, Messick (1984) summarized several differences between cognitive styles and cognitive abilities. "Cognitive styles essentially refer to the manner or mode of cognition ... to the question of How? Abilities essentially refer to the content, component processes, and level of cognition ... to the question of What? and How much?" (p. 62). However, he mentioned that there are various degrees of difference and overlap between cognitive styles and abilities in terms of both conception and measurement.

Vasquez (1991) summarized two difficulties in differentiating cognitive styles from intelligence or abilities. One difficulty was in the measures used to assess cognitive styles. He reviewed Wachtel (1972) who stated that "The cognitive style constructs are assessed by cognitive performance tests, but actually cognitive styles may relate to preference to deal with life situations" (p. 7). Wachtel (1972) reviewed Witkin's term 'style' and summarized that "(it) is consistent with the view, expressed in some of his writings, that the measures he uses pick up an indication of divergent directions of psychological development and preferred mode of perceiving" (p. 180). Thus, it can be said that the self-consistent mode of perceiving may be associated not only with thinking and memorizing but also with personality. Thus, it is difficult to assess a personal

preference of individual in the way in which they choose and organize their visual framework.

The second difficulty Vasquez pointed out was as follows: "The scores from EFT should have meaningful, even significant correlations with scores from ability and intelligence tests. However, these tests show an ability to function well in certain types of tasks, but not a style of functioning" (p. 7). There is also a critical analysis of the present research on the FI/D cognitive style dimensions by the use of EFT and GEFT. Witkin's FI/D dimension focused on assessment of the extent of an analytic ability, while Kogan's test was more focused on a measure of preference for the analytic mode.

In spite of some confusions and difficulties in differentiating cognitive styles from intelligence or abilities, several studies have been conducted to conceptualize how cognitive styles may relate to intelligence or abilities.

Guilford (1967) first conceptualized intelligence as having a process dimension. He proposed a "structure of intellect" (SI) model in which he showed that cognitive styles overlap with cognitive abilities. He mentioned that the amount of information, ways of information processing, and steps in problem solving make a difference in the FI/D cognitive styles. Green (1985) summarized the SI model: "Intellectual functioning has three dimensions: operations,

content, and products. Mental operations are cognition, memory, divergent thinking, convergent thinking and evaluation. Content types are figurative, symbolic, semantic and behavioral. Products or forms of information are units, classes, relations, systems, transformations, and implication" (p. 2).

Goldstein and Blackman (1978) reported that "A number of studies have shown a positive relationship between field-independence and intelligence" (p. 185). Saracho (1984) observed that "Goodenough and Karp (1961) and Witkin et al. (1974) also found significant correlations between scores on FI/D and scores on the Stanford-Binet and WISC tests of intelligence" (p. 45). He concluded that because academic skills overlap with intelligence cognitive styles may be related to academic achievement. Goldstein and Blackman (1978), reviewing the studies on cognitive styles for the past twenty years, concluded that various measures of FD are related to various measures of both verbal and performance intelligence" (p. 186). They found that the correlation between FI/D and academic achievement and aptitude tests was in the .40 and .60 range.

Thus, a number of studies have been conducted to examine what kind of cognitive styles may relate to academic success. Cohen (1969) explained the relationship between particular cognitive styles and academic achievement, identifying three major factors underlying successful school performance:

"(1)breadth and depth of informational content; (2) the ability to abstract analytically, and (3) the ability to extract salient information from its embedding context" (p. 828). This means that educational environment, academic achievement, and test criteria require FI. Shade (1982) also identified various studies on the significant relationship between the FI cognitive style and the schooling process. She concluded that FI analytic categorizing information processing strategies foster school success. Thus, it is understood that FI has a significant relationship with academic achievement.

Satterly (1976) studied the interrelationship of intelligence, FI, analytic cognitive style, and spatial and perceptual abilities among 201 boys, age 10-11 years. It was hypothesized that there were cognitive style differences in achievement in English and mathematics. The results revealed that substantial overlap was found between FI and intelligence. However, there were significant residual correlations at the .01 level between FI and mathematics after intelligence was held constant. He summarized that "The correlation of EFT with spatial and achievement tests is in part attributable to its overlap with intelligence" (p. 38). He found that EFT was not correlated with the two verbal tests after intelligence was held constant. In contrast, Pits and Thompson (1982) have found that more FI individuals tend to perform better on inferential reading-comprehension tasks.

Witkin and his colleagues found individual differences in

intellectual and psychological domains as well as perception. Thus, studies on cognitive styles as measured by FI/D have become important among educators, especially, in regard to the relationship with academic achievement. In terms of the FI/D dimension, Witkin shifted his emphasis from perception to the individual's psychological differentiation. The term "cognitive style" has been reintroduced in the field of education through application to educational problems. These areas of educational problems require knowledge about teaching and learning processes such as how students learn, how teachers teach, and how teachers and students interact, in relation to students' cognitive performance and social behavior in the classroom. The relationships between perceptual, intellectual, and psychological domains have been investigated by educators in order to provide information on how students learn and how teachers teach. The FI/D cognitive styles are considered to be playing a significant role in influencing children's preference for learning methods and learning process.

Saracho (1984) summarized educational implications for measuring the FI/D cognitive styles. "Measures of cognitive characteristics relating to intellectual abilities, information-processing skills, and subject matter knowledge are essential for educational theory and practice. Personality characteristics can also be classified as aptitudes because they predict the student's responses to

instruction and the educational environment" (p. 49). Witkin et al. (1977) summarized that "The FD and FI cognitive styles are process rather than content variables; they are pervasive dimensions of individual functioning; people tend to be stable over time in their standing on them; they are bipolar and value neutral" (p. 198). This bipolar FI/D dimension indicates the individual's mode of preference of social interaction. In this sense, the FI/D dimension is considered as personality measures rather than ability measures. Furthermore, over time the FI/D dimension became equal as learning traits rather than positive and negative traits respectively of individuals.

In summary, Witkin's longitudinal and other studies on the FI/D cognitive styles found significant gender differences. In addition, they found that group differences in cultural backgrounds make differences in cognitive style and socialization. Especially, females and children are more strongly affected by the surrounding world. Saracho (1989b) reported that "Cross-cultural studies in cognitive style showed that the FI/D dimension integrates individual differences in the cognitive, perceptual, interpersonal and intrapsychic realms" (p. 79). Furthermore, it was found that the FI/D dimension "describes these differences in relation to the individual's antecedent socialization processes, which are considered to parallel cross-cultural differences in the socialization characteristics of cognitive style" (p. 79).

Many cross-cultural researchers have attempted to explain how FI/D cognitive styles may relate to gender, age, and culture backgrounds and to academic achievement (Witkin, Goodenough & Karp, 1967; Witkin, Moore, Friedman & Owen, 1976; Ramirez, 1982; Saracho, 1983). They concluded that cultural backgrounds produce differences in both cognitive patterns and the forms of social interaction. Thus, the FI/D cognitive style is an important variable of psychological differentiation in academic achievement which may overlap with variables such as sex, age, cultural background, and socioeconomic status.

However, most cross-cultural studies on cognitive styles were conducted on particular ethnic groups such as Blacks, Hispanics, and Jews of the United States or European countries who do not do well in school. There is a lack of studies on non-Western students such as Japanese-born students who may do well in schools in Japan and in different cultural settings. Thus, a study on FI/D cognitive styles of Japanese students is essential for educational theory and practice to find traits of students that correlate with academic achievement. In particular, it is beneficial for educators to predict minority students' responses to instruction and the educational environment, which are different from their own.

2. Hypotheses

The following hypotheses were designed to test the variables addressed in the problem statement:

Hypothesis A:

Cognitive styles of Japanese students in American high schools are highly FI with no significant differences from those of white-American students.

Rationale:

Witkin et al. (1971) and a number of researchers proved that white-American students tend to be FI. Cohen (1969) also found that FI (analytic) was dominant among middle-class students, while few students from low-income backgrounds used the analytic mode. Cohen gave a significant role to socioeconomic status as a determinant of the FI/D cognitive styles rather than ethnicity.

In this study, the majority of the students come from middle-class family backgrounds. Although Japanese students have unique cultural backgrounds, their socioeconomic status is very similar to that of American students. Japanese social value-orientations such as a competitive individualism prevail in the Japanese society and its education system. This value also prevails among middle-class American families. Thus, socioeconomic status is held constant. In addition, Japanese culture highly values strong ego boundaries and high degrees of internality. This cultural value is associated with a sense of separation from others and it may influence cognitive

styles of Japanese children.

Thus, it was hypothesized that cognitive styles of Japanese students are highly FI. Furthermore, no significant differences in GEFT scores exist between Japanese and white-American students.

Hypothesis B:

A significant, positive relationship exists between the FI cognitive styles of Japanese students and their academic achievement as identified as GPA, MAT, and Competence Test scores:

Hypothesis B-1:

GEFT scores of Japanese students are positively related to GPA and math course grades, but not positively related to English course grades.

Hypothesis B-2:

GEFT scores of Japanese students are positively related to MAT math scores, but not positively related to MAT reading or language arts scores.

Hypothesis B-3:

GEFT scores of Japanese students are positively related to Competence Test math scores, but not positively related to Competence Test reading and writing scores.

Rationale:

Shade (1982) reviewed Kogan, Coop, and Sigel's studies on the correlation between school success and traits of successful students and found that the following traits seemed

to predominate:

(1) An attention style that focuses on task itself, not on people in the situation.

(2) An abstraction ability that separates ideas and concepts into parts and reweaves them into a unified whole.

(3) A perceptual style that leads to the abstraction of both obvious and non-obvious attributes that seemingly link things, ideas, or principles.

(4) A perceptual style that facilitates the extraction of important information embedded in distracting influences.

(5) A long attention span with prolonged concentration ability.

(6) An attending preference for verbal cues rather than nonverbal cues.

(7) A reflective rather than an impulsive response style in problem solving.

(8) A highly differentiated or analytical thinking style that leads to abstract and logical reasoning (p. 232).

These findings suggest that FI has a positive relationship with academic achievement. Cohen (1969) mentioned that standardized tests reflect certain learning styles. Cohen further mentioned the relationship between the culture of the school and cognitive style. He pointed out that there are assumptions that the school functions to increase the level

of students' cognitive abilities and that educators have been concerned about the quantitative measure of cognitive abilities. In other words, FI provides an advantage in that most intelligence tests used in educational settings and academic achievement are biased in favor of FI. Academic success may relate to the areas of subject matter. For example, math requires more analytical skills than other subject matters such as English, social studies, and music.

Thus, it was hypothesized that a significant, positive relationship exists between the FI cognitive style of Japanese students and their academic achievement as measured by GPA, MAT, and Competence Test scores.

Roberge & Flexer (1984) studied the relationship between cognitive style and reading achievement of 450 students at a suburban middle school by the use of GEFT and FORT (Formal Operational Reasoning Test). Results revealed that there were no significant differences in the total reading, word knowledge, and reading test scores of FI and FD students.

In addition, Witkin and Goodenough (1977b) mentioned that the ability to manipulate verbal materials is primarily a function of traditional school experience rather than individual differences in FI/D. This indicates that the FI/D cognitive styles may not be associated with verbal ability. Thus, it was hypothesized that no significant, positive relationships exist between FI and English course grades or

verbal test scores. However, Roberge & Flexer found a significant relationship between level of operational development and reading achievement. They suggested that formal operational thinking is a key factor in a student's academic success with reading.

In addition, Klein (1979) suggested that in order to foster reading achievement it is important to use instructional approaches and materials that may foster the development of analytical thinking skills. In this sense, analytical abilities part of math abilities may foster the development of reading abilities. However, there will be no significant direct relationships between the FI cognitive style and verbal abilities.

Hypothesis C:

A significant, gender difference exists in the relationship between GEFT scores of Japanese students and their academic achievement:

Hypothesis C-1:

Japanese male students are more FI than Japanese female students.

Hypothesis C-2:

Japanese female students have more variation than Japanese male students in the FI/D cognitive styles.

Hypothesis C-3:

The positive relationship between GEFT scores and math course grades among Japanese male students is significantly

greater than that among Japanese female students.

Rationale:

Kato (1965) found that there were small but consistent gender differences among Japanese children in EFT scores. Witkin et al. (1967) found that males tend to be slightly but consistently more FI than females. As stated before, EFT proved to have high reliability and validity. In addition, a reasonably high correlation was found between GEFT and EFT, particularly for males. The findings of EFT performance in Kato's study would also be found in this study which measured GEFT performance. Thus, it was hypothesized that Japanese students are more FI than Japanese female students.

Witkin et al. (1967) conducted a longitudinal study in two groups (one from 8 to 13 years, the other, from 10 to 24 years) in terms of development of differentiation as reflected FI/D cognitive styles. The findings of RFT performance revealed that there is a significant increase in degree of FI with age up to 17 years and there is no further change from 17 to 24. Gender differences by age were also found, especially in males. In addition, within each gender, wide ranges of RFT performance were found, but particularly in females. These findings showed that socialization plays a significant role in the development of cognitive styles. There are differences in child-rearing and socialization between males and females. Gender-role expectations for

Japanese children may also be highly influential. Thus, it was hypothesized that Japanese female students have more variation than Japanese male students in the FI/D cognitive styles.

Messick (1976) stated that men tend to show interests in technical and mathematical activities which refer to analytical skills and that women tend to prefer activities that refer to interpersonal skills. Thus, it was hypothesized that the positive relationship between GEFT scores and math course grades of Japanese male students is significantly greater than that of Japanese female students.

Hypothesis D: No significant, positive relationships exist
between GEFT scores of Japanese students and number of years in American schools:

Rationale:

Witkin et al. (1967) found significant age differences in the FI/D cognitive styles. The findings revealed that there is a consistency in perceptual functioning and relative stability of the level of psychological differentiation during development, especially in young adulthood. However, Witkin did not find evidence among children from less stable environments or in different cultural settings where meaningful significant psychological changes occur.

Several studies found a significant relationship between FI and academic achievement, especially subject

matter which requires analytical abilities. In addition, some studies found no correlations between FI and reading test scores (Coop and Sigel, 1971; Shade 1982; Roberge and Flexer, 1984). An increase in number of years in American schools indicates a likely increase in verbal abilities, and as a result, that may foster reading abilities. However, analytical abilities may not directly relate to verbal abilities although analytical abilities may help children foster overall cognitive abilities which include reading abilities.

Thus, it was hypothesized that no significant, positive relationships exist between GEFT scores of Japanese students and number of years in American schools.

CHAPTER III. METHODOLOGY

This research study performed four tasks. First, it identified cognitive styles of Japanese students in two American high schools and compared these with those of white-American students. Second, it investigated how cognitive styles of Japanese students may relate to their academic achievement. Third, it investigated how their cognitive styles may relate to gender and number of years in American schools. And fourth, it investigated the presence of any cross-correlation between these variables.

1. Selection of Schools

Two American public high schools located in a middle-class suburban city with a large concentration of Japanese population were selected. These two schools have similar student populations, coming primarily from white middle-class families. Japanese families who came to the States for business purposes have very similar socioeconomic statuses as those of white-American families. Because of this, the variable of socioeconomic status was held constant.

Both schools provide ESL to language minority students as a transitional bilingual program. As of January 1, 1992, thirty out of seventy-three Japanese students (both Japanese-born and Japanese-American students) were learning ESL, the rest of them were in the mainstream classrooms.

2. Selection of Subjects

The subjects constituted twenty-one Japanese-born students (11 males and 10 females) who were enrolled in the ninth through eleventh grades and sixty-three white-American students (39 males and 24 females) from four math classes in the two high schools.

First, seventy-three Japanese-born and Japanese-American students (35 males and 38 females) were identified, based on Asian student lists obtained from the Registrar's Office. Second, a parent consent form with Japanese translation was sent to all Japanese parents. Twenty-four consent forms were returned. Among them, twenty-one Japanese-born students were identified through a simple survey during the administration of the GEFT (28.8 percent of total Japanese students).

Parent consent was also requested of all white-American students in four math classes and one senior psychology class. Ninety-four consent forms were returned. (28 ninth-graders, 18 tenth-graders, 17 eleventh-graders, and 31 twelfth-graders). Since no senior Japanese students submitted consent forms, thirty-one senior white-American subjects were not included in this comparative study.

3. Instruments

A. Measures of the FI/D Cognitive Styles:

The Group Embedded Figures Test (GEFT) was used as a measure of field independent/dependent (FI/D) cognitive

styles. GEFT was designed to assess the FI/D cognitive styles in group administrations. This scale is an adaptation of the Embedded Figures Test (EFT) which was an original perceptual, speed test.

GEFT contains 18 complex figures, 17 of which were taken from EFT. GEFT consists of three sections: The First Section which contains seven simple items is not calculated in the final score. In the Second and the Third Sections, each section contains nine more difficult items. The sample figures are given on the back page of a booklet so that the subject is prevented from discovering simultaneously the simple figures and the complex figures which contain it. The time limit of the test session is twenty minutes. Subjects are given two minutes to complete the First section of the test and five minutes to complete each of the remaining sections. The score is the total number of simple figures correctly traced on the complicated figures of the Second and the Third Sections. The higher scores indicate more FI, and the lower scores, more FD.

Because GEFT is a non-verbal test and said to be culture-free in its context, it may be applied to groups with different languages and cultures. In this respect, GEFT may have adequate validity to assess the FI/D cognitive styles of Japanese students whose culture is very different from American culture.

B. Measures of Academic Achievement:

Three measures were used as dependent variables to assess academic achievement of the two ethnic groups. These are (1) Grade Point Average (GPA), (2) Metropolitan Achievement Test (MAT), and (3) Competence Test.

(1) GPA:

GPA is a grade point average gained from all subject matters; math, English, science, social science, fine arts, health, occupational education, physical education and speech. Academic achievement is evaluated as GPA, which contains four levels; A = 4, B = 3, C = 2, and D = 1. GPA is calculated each semester. Cumulative GPA refers to a grade point average gained from total semesters. All students take math and English every semester as major curricula. It was hypothesized that GEFT scores relate to math course grades but not to English course grades. The study also examined whether cross-correlations exist between GPA, math, and English course grades. Thus, cumulative GPA, and separate math and English course grades were used in this study.

(2) MAT:

MAT, developed by Balon, Farr, Hogan, and Prescott in 1978, is a comprehensive system of survey tests. It was designed to measure achievement in math, reading, and language arts at grades K through twelve. It has a two-component

system which consists of a set of survey tests and a set of instructional tests. In this study, a set of instructional tests was used, because this was administered to most students. MAT consists of raw scores and percentile scale (national, state, and local). The local percentile (the school district level) is the highest among three percentiles. The Washington State percentile is higher than the national percentile. It indicates that the school district has higher academic achievement scores than the averages of the State of Washington and the nation. In this study, the raw score of MAT was used, because for the Competence Test the raw score was used.

Students were administered MAT at grade nine in 1989 as part of the regular school district evaluation program. Since 1990, MAT has not been administered and will be replaced by the Curriculum Frameworks Assessment System (CFES) in 1992. Thus, MAT scores as of 1989 were only available for use as a measure of academic achievement.

(3) Competence Test:

The Competence Test has been used as a district-wide basic skills tests and as minimum competency for graduation for decades. It consists of math, reading, and writing. Math and reading competence tests consist of multiple-choice questions, while a writing competence test is an essay with a given topic. Each test is given to all students once a year.

However, students who have not met the minimum requirement have to take the test again.

To meet minimum competency for graduation, a student must achieve a math score of 70 percent for the test, a reading score of 75 percent, and a writing score of 60 percent. For a writing competence test, a student must gain a score of more than 60 percent for each subcategory of the test.

A math competence test contains ten subdivisions, focused on computation. The time limit of the test session is 35 minutes.

A reading competence test includes four sections, each of which contains subcategories. The details are as follows:

(a) Graphic aids (12 points)
Graphs, maps, tables, and schedules
(b) Directions (9 points)
Recipes, operation/assembly, application forms
(c) Info. retrieval (21 points)
Table of contents, index, dictionary, card catalog, purchase catalog, telephone directory, classified ads.
(d) Comprehension (15 points)
Sequence, main idea (stated), main idea (implied), fact vs. opinion, cause/effect, and context clues

A writing competence test is an essay. A student must write at least one and a half pages but no more than two and a half in average-sized handwriting or printing. A test is given in the English class over two days (fifty minutes each). On the first day, an essay question is given, then a student will have fifty minutes to get ideas, plan, and draft his/her paper. On the second day, a student will have fifty minutes to edit his/her paper and write a final copy.

Evaluation of the writing competence test consists of ten criteria. These are purpose, information, organization, language, sentence structure, usage, capitalization, punctuation, spelling, and legibility. Each category yields ten points.

C. A Simple Survey:

A simple survey was conducted among the two groups in order to collect the necessary information during the administration of GEFT. The survey questions contained nationality (Japanese-born or Japanese American students), and number of years in American schooling. Students' GPA and test scores were checked with cumulative students' records.

4. Collection of Data

A. Measures of the FI/D Cognitive Styles:

Twenty-one Japanese and sixty-three white-American students from ninth through eleventh grades in the two schools were measured on the FI/D dimension by the use of GEFT.

GEFT was administered to the Japanese subjects, who submitted parent consent forms, during lunch time over a period of three weeks, because those students were scattered in several ESL and mainstream classrooms. Test instruction was given in Japanese with Japanese translation for the test.

GEFT was administered in math classes over the period of

five weeks to the white-American subjects who submitted parent consent forms. Scores of other minority students were not included in the data.

Test results were categorized into three groups: 1) FI = top 1/3; 2) MID = intermediate 1/3; and 3) FD = bottom 1/3. It was expected that a significant difference between FI and FD scores would be found. Test scores of Japanese students were compared with those of white-Americans to assess the degree to which Japanese students tend to be FI or FD.

B. Measures of Academic Achievement:

GPA, MAT and Competent Test scores were collected from the two groups through a simple survey during the administration of GEFT. The data were derived from cumulative students' records. GEFT scores were compared with GPA, (cumulative GPA, math and English course grades), MAT (math, reading, and language arts), and Competence Test (math, reading, and writing) scores.

C. Relationships between cognitive styles of Japanese students and gender and number of years in American schools:

The necessary information, such as age, gender, nationality (Japanese-born or Japanese-Americans), number of years in American schooling, as well as GPA, MAT, and Competence Test scores, was collected through a survey during the administration of GEFT.

D. Cross-correlations between all data were examined to determine whether there were any significant relationships in cognitive styles within main hypotheses.

5. Statistical Procedures

Data were analyzed statistically by the use of the one-tailed t-test and the Spearman Correlation coefficients. The entire sample was analyzed by subcategories of ethnic background and gender. Hypotheses were tested at the .05 level of significance. In addition, cross-correlation coefficients between the above variables were analyzed.

CHAPTER IV. RESULTS

1. Review of Hypotheses

The following hypotheses were tested in this study:

Hypothesis A: Cognitive styles of Japanese students in American high schools are highly FI with no significant differences from those of white-American students.

Hypothesis B: A significant, positive relationship exists between the FI cognitive style of Japanese students and their academic achievement as measured by GPA, MAT, and Competence Test scores.

Hypothesis B-1: GEFT scores of Japanese students are positively related to GPA and math course grades, but not positively related to English course grades.

Hypothesis B-2: GEFT scores of Japanese students are positively related to MAT math scores, but not positively related to MAT reading or language arts scores.

Hypothesis B-3: GEFT scores of Japanese students are positively related to Competence Test math scores, but not positively related to Competence Test reading and writing scores.

Hypothesis C: A significant, gender difference exists in the relationship between GEFT scores of Japanese students and their academic achievement.

Hypothesis C-1: Japanese male students are more FI than Japanese female students.

Hypothesis C-2: Japanese female students have more variation than Japanese male students in the FI/D cognitive styles.

Hypothesis C-3: The positive relationship between GEFT scores and math course grades among Japanese male students is significantly greater than that among Japanese female students.

Hypothesis D: No significant, positive relationships exist between GEFT scores of Japanese students and number of years in American schools.

Tables 7 and 8 identify the subcategories and variables measured in this study.

TABLE 7: Subcategories and Variables Measured in This Study (One-Tailed T-Tests)

HYPO.	ETHNICITY	GENDER	GEFT	GPA	MATH	ENGLISH	NO. OF YEARS IN AMERICAN SCHOOLS
HA	J/W-A	TTL	X	-	-	-	-
HB-1	J/W-A	TTL	X	X	X	X	-
HB-2	-	-	-	-	-	-	-
HB-3	-	-	-	-	-	-	-
HC-1	J/W-A	M/F	X	-	-	-	-
HC-2	J/W-A	M/F	X	-	-	-	-
HC-3	J/W-A	M/F	X	X	X	X	-
HD	J	TTL	-	-	-	-	X
	J	M/F	-	-	-	-	X

TABLE 8: Subcategories and Variables in This Study (Spearman Correlations)

	JAPANESE			WHITE-AMERICANS		
	TTL	M	F	TTL	M	F
HB-1						
GEFT						
GPA	X	-	-	X	-	-
MATH						
ENGLISH						
HB-2						
GEFT						
MAT MATH						
READING	(X)	-	-	X	-	-
LANGUAGE ARTS						
TTL						
HB-3						
GEFT						
COMP. MATH	X	-	-	X	-	-
READING						
HC-3						
GEFT						
GPA	-	X	X	-	X	X
MATH						
ENGLISH						
HD						
GEFT						
GPA						
MATH						
ENGLISH	X	X	X	-	-	-
NO. OF YEARS						
IN AMERICAN						
SCHOOLS						

(X) = Data were not available.

2. Hypothesis A

The first hypothesis stated that cognitive styles of Japanese students in American high schools are highly FI with no significant differences from those of white-American students.

Tables 9 and 10 show raw GEFT scores of Japanese and white-American students. Histograms of GEFT scores for Japanese and white-American students are illustrated in Figures 1 and 2. GEFT scores of both groups are bimodes and negatively skewed. For Japanese students the negative skewness is much greater.

As presented in Table 11, the results of the one-tailed t-test show that the mean GEFT score of Japanese students ($\bar{X}$ = 14.29) is significantly higher ($p = .013$) than that of white-American students ($\bar{X}$ = 11.70). Therefore, there is a significant difference in the FI/D cognitive styles between Japanese and white-American students.

In addition, the standard deviation of GEFT scores for white-American students ($s = 4.75$) is higher than that of Japanese students ($s = 3.68$). However, since the data are insufficient, a significant difference in the standard deviations between the two groups cannot be calculated.

TABLE 9: Raw GEFT Scores of Japanese Students

N	GENDER	GEFT SCORES	
01	M	18	
02	F	18	
03	F	17	
04	M	17	
05	M	17	
06	M	17	N = 7
07	F	17	FI : X = 17.29
08	M	17	
09	F	17	
10	M	16	
11	F	16	
12	M	16	
13	F	15	N = 7
14	F	14	MID : X = 15.00
15	M	12	
16	F	11	
17	M	11	
18	F	11	
19	M	10	
20	F	8	N = 7
21	M	5	FD : X = 9.71

N = 21
X = 14.29
SD = 3.68
Range = 13

TABLE 10: Raw GEFT Scores of White-American Students

N	GENDER	GEFT SCORES		N	GENDER	GEFT SCORES	
01	M	18		43	M	9	
02	M	18		44	M	9	
03	F	18		45	M	8	
04	M	18		46	F	8	
05	F	18		47	F	8	
06	F	18		48	M	8	
07	M	17		49	F	8	
08	M	17		50	M	8	
09	F	17		51	M	8	
10	M	17		52	F	7	
11	M	17		53	M	6	
12	M	17		54	F	6	
13	M	17		55	M	6	
14	M	16		56	M	5	
15	M	16		57	M	5	
16	M	16		58	M	4	
17	F	16		59	F	4	
18	M	16		60	F	4	
19	F	16		61	M	3	
20	M	15	FI	62	M	3	FD
21	M	15	X = 16.81	63	F	3	X = 6.14
22	M	15					
23	F	15					
24	M	15					
25	M	15					
26	F	14					
27	M	14					
28	F	13					
29	F	13					
30	M	13					
31	M	13					
32	F	12					
33	M	12					
34	F	12					
35	M	12					
36	F	11					
37	F	10					
38	M	10					
39	F	9					
40	F	9					
41	M	9	MID				
42	M	9	X = 12.14				

N = 63
X = 11.70
SD = 4.75
Range = 15

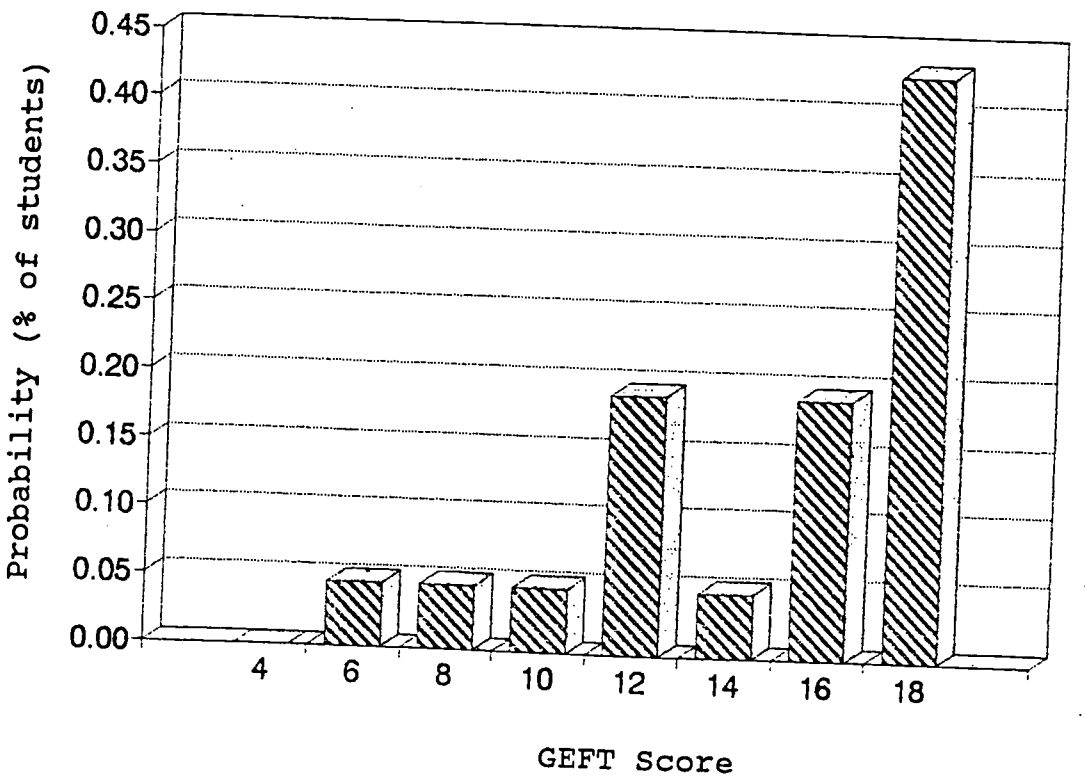

FIGURE 1: GEFT Scores of Japanese Students

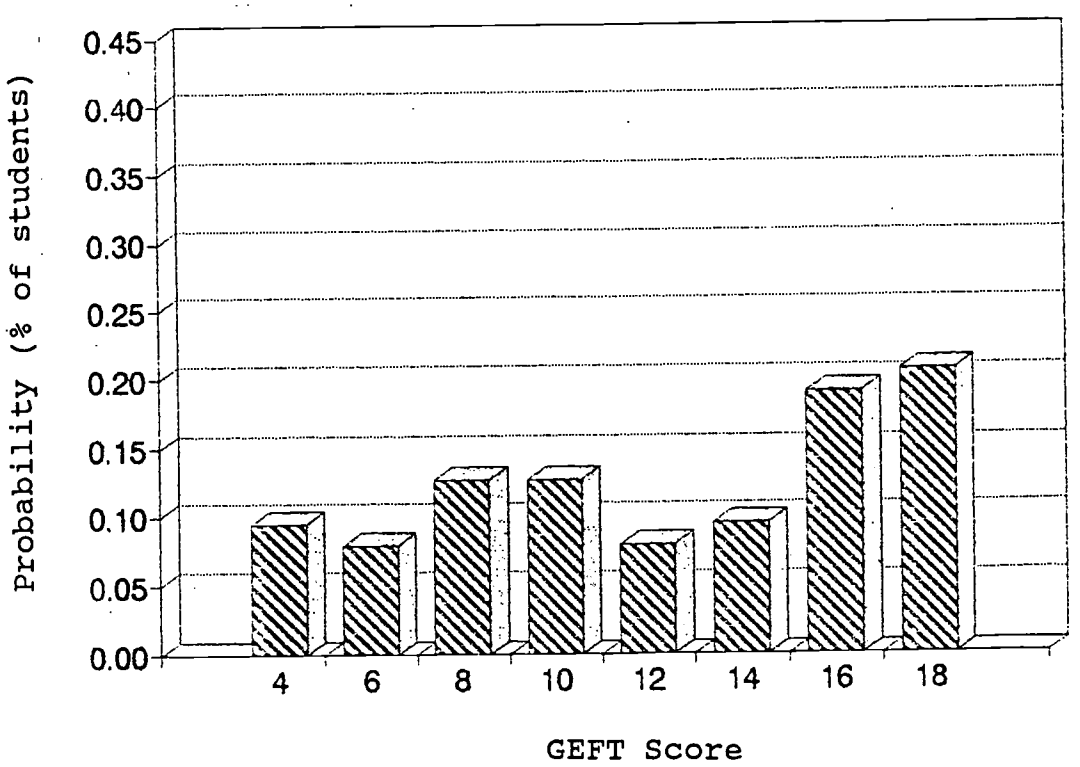

FIGURE 2: GEFT Scores of White-American Students

TABLE 11: Means and Standard Deviations of GEFT Scores for Japanese and White-American Students

	N	MEAN	STDEV	T/CRIT	T/ACT	SIGNIFICANCE
J	21	14.29	3.68	2.374	2.59	.013
W-A	63	11.70	4.75			

Since the preliminary norms of GEFT scores are available for only American male and female college students (See Table 5, p. 25), the mean GEFT scores of the two ethnic groups in this study cannot be compared to national norms at the high school level. However, these values are comparable to the college norms. As shown in Table 11, the mean score of Japanese students is significantly higher ($p = .013$) than that of white-American students. The mean score of sixty-three white-American high school students ($X = 11.70$) is similar to that of 397 American college students ($X = 11.27$) (See Table 5, p. 25). Thus, it can be stated that the mean GEFT score of Japanese students ($X = 14.29$) is significantly higher (at least, $p = .013$) than that of American college students.

The hypothesis was also tested by the use of GEFT scores where the data divided into three groups; (1) FI, (2) MID, and (3) FD. As presented in Table 12, a significant difference was found between FI and FD in the both ethnic groups. Further analysis shows that for each of these groups of students (FI/MID/FD) Japanese students always score higher.

This result should be expected as shown in the histograms.

TABLE 12: Means of GEFT Scores Classified as FI/MID/FD for Japanese and White-American Students

	JAPANESE MEAN	N = 21	WHITE-AMERICANS MEAN	N = 63
FI	17.29	7	16.81	21
MID	15.00	7	12.14	21
FD	9.71	7	6.14	21

* Due to a lack of data, differences between the two groups cannot be compared.

Thus, it is concluded that Japanese students are more FI than white-American students. The data support the hypothesis that cognitive styles of Japanese students in American high schools are highly FI. However, a significant difference in the FI/D cognitive styles between the two groups exists. Thus, Hypothesis A is partly supported and partly rejected.

3. Hypothesis B

The second hypothesis stated that a significant, positive relationship exits between the FI cognitive style of Japanese students and their academic achievement as measured by GPA, MAT, and Competence Test scores. The results of GEFT scores show that the cognitive styles of Japanese students are highly FI. Thus, the Spearman correlations were used to analyze the

relationships between GEFT scores and GPA, MAT, and Competence Test scores.

Hypothesis B-1:

It was hypothesized that GEFT scores of Japanese students are positively related to GPA and math course grades, but not positively related to English course grades.

This hypothesis was tested using the Spearman Correlation and the one-tailed t-test. As presented in Table 13, the results show that there are no correlations between GEFT scores and GPA ($r = -0.119$), math course grades ($r = 0.198$) or English course grades ($r = -0.064$) among Japanese students. However, as should be expected, a significant relationship ($p = .005$) was found between GPA and subject matters. GPA is significantly related to math ($p = .005$, $r = 0.710$) and English course grades ($p = .005$, $r = 0.804$). In addition, there is a significant relationship between math and English ($p = .005$, $r = 0.594$).

TABLE 13: Spearman Correlations between GEFT Scores and GPA, Math and English Course Grades among Japanese Students

	GEFT	GPA	MATH
GPA	-0.119		
		****	
MATH	0.198	0.710	
		****	****
ENGLISH	-0.064	0.804	0.594

**** p = .005

As presented in Table 14, among white-American students, the same results were found; that is, no significant correlation exists between GEFT scores and GPA (r = 0.167), math (r = 0.157) or English course grades (r = 0.107), and there is a significant correlation (p = .005) between GPA, math, and English.

TABLE 14: Spearman Correlations between GEFT Scores and GPA, Math, and English Course Grades among White-American Students

	GEFT	GPA	MATH
GPA	0.167		
		****	
MATH	0.157	0.740	
		****	****
ENGLISH	0.107	0.735	0.512

**** P = .005

For further analysis, difference of means for GPA, math, and English between Japanese and white-American students was analyzed by the use of the one-tailed t-test. As shown in Table 15, no significant differences in GPA were found between the two groups.

TABLE 15: Means and Standard Deviations of GPA for Japanese and White-American Students

	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J	21	3.266	0.529	82	1.665	0.76	NS
W-A	63	3.162	0.593				

In contrast, as reported in Table 16, the mean of math course grades for Japanese students is significantly higher ($p = .05$) than that of white-American students.

TABLE 16: Means and Standard Deviations of Math Course Grades for Japanese and White-American Students

	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J	21	3.333	0.856	82	1.665	1.99	.05
W-A	63	2.87	1.08				

As reported in Table 17, there are no significant differences in English course grades between the two groups.

TABLE 17: Means and Standard Deviations of English Course Grades for Japanese and White-American Students

	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J	21	2.81	1.03	82	1.665	-0.19	NS
W-A	63	2.857	0.965				

Thus, the data show that GEFT scores have no correlation with either GPA or Math or English course grades. Hypothesis B-1 is partly rejected (GEFT scores of Japanese students were not positively related to GPA or math course grades) and partly supported (GEFT scores of Japanese students were not positively related to English course grades). The same results were found for white-Americans. The only difference between the two groups is that the mean of math course grades of Japanese students is significantly higher ($p = .05$) than those of white-American students.

Hypothesis B-2:

The hypothesis stated that GEFT scores of Japanese students are positively related to MAT math scores, but not positively related to MAT reading or language arts scores.

Since most Japanese students apparently lack English proficiency (57 % are in ESL classes. See Table 33, p. 84), only a few MAT scores were available. Thus, testing Hypothesis B-2 was impossible. However, for the sake of

learning about how the variables in Hypothesis B-2 relate to GEFT scores, the white-American students' scores were analyzed.

As reported in Table 18, the results show that there is a significant correlation (p = .05) between GEFT and MAT math scores (r = 0.231) among white-American students. However, no correlations were found between GEFT and reading (r = 0.194) or language arts (r = 0.104) or total scores (r = 0.180). Furthermore, a significant cross-correlation (p = .005) was found among MAT subscores. Thus, Hypothesis B-2 is supported if white-American students are substituted for Japanese students.

TABLE 18: Spearman Correlations between GEFT scores and MAT Math, Reading, Language Arts, and Total Scores among White-American Students

	GEFT	MAT MATH	MAT R	MAT L/A
MAT MATH	0.231 *			
MAT R	0.194	0.384 ****		
MAT L/A	0.104	0.579 ****	0.601 ****	
MAT TTL	0.180	0.808 ****	0.752 ****	0.867 ****

**** p = .005
* p = .05

Hypothesis B-3:

The hypothesis stated that GEFT scores of Japanese students are positively related to Competence Test math scores, but not positively related to Competence Test reading and writing scores.

Since writing test scores were available for only a small number of students in the two groups, this hypothesis only tested the relationship between GEFT and Competence Test math and reading scores. In addition, since some students did not take the math or reading test, the correlation between math and reading scores was not calculated.

As shown in Table 19, no significant correlations were found between GEFT and Competence Test math scores. However, a significant, negative correlation ($p = .05$) was found between GEFT and competence reading test scores ($r = -0.439$).

TABLE 19: Spearman Correlations between GEFT Scores and Competence Math and Reading Test Scores among Japanese Students

	GEFT
COMPETENCE MATH	0.058
COMPETENCE READING	-0.439*

* p = .05

Thus, the data do not support the hypothesis that GEFT scores of Japanese students are positively related to

Competence Test math scores, and those scores are not positively related to Competence Test reading scores. Thus, Hypothesis B-3 is rejected.

As presented in Table 20, among white-American students, no significant correlation was found between the above variables. Thus, Hypothesis B-3 is not supported for white-American students, either. The only difference between the two groups is that there is a significant negative correlation between GEFT and Competence Test reading scores among Japanese students.

TABLE 20: Spearman Correlations between GEFT Scores and Competence Math and Reading Test Scores among White-American Students

	GEFT
COMPETENCE MATH	-0.155
COMPETENCE READING	-0.116

No significant correlations.

4. Hypothesis C

The third hypothesis stated that a significant gender difference exits in the relationship between GEFT scores of Japanese students and their academic achievement.

Hypothesis C-1:

The hypothesis stated that Japanese male students are more FI than Japanese female students.

As presented in Table 21, the results of the one-tailed t-test show that the t actual value (t = -0.90) is smaller than the t critical value (t = 1.729). This indicates that there are no significant differences in the mean GEFT score between Japanese male and females. Thus, there are no significant differences in the FI/D cognitive styles between the two groups. Therefore, Hypothesis C-1 is rejected.

TABLE 21: Means and Standard Deviations of GEFT Scores for Japanese Male and Female Students

GENDER	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
M	11	14.18	4.12	19	1.729	-0.90	NS
F	10	14.40	3.34				

For interest's sake, white-American male and female students were also compared. As presented in Table 22, the mean performance of male students (X = 12.00) is higher than that of female students (X = 11.21). In addition, the standard deviation of male students is higher than female students. However, the t actual value (t = 0.64) is smaller than the t critical value (t = 1.671). Thus, there are no significant differences in GEFT scores between white-American

male and females.

In reviewing the entire sample, as presented in Tables 21 and 22, the mean GEFT score of Japanese female students is the highest. Since total GEFT scores of Japanese students are significantly higher than total white-American GEFT scores, as shown in Table 11, it thus appears that Japanese female students are the most FI in the entire sample.

TABLE 22: Means and Standard Deviations of GEFT Scores for White-American Male and Female Students

GENDER	N	MEANS	STDEV	DF	T/CRIT	T/ACT	SIG.
M	39	12.00	4.82	61	1.671	0.64	NS
F	24	11.21	4.69				

It is interesting to note that there is a significant difference ($p = .013$) in the mean GEFT score between Japanese and white-American students, as presented in Table 10. However, no significant gender differences were found within each ethnic group.

Hypothesis C-2:

The hypothesis stated that Japanese female students have more variation than Japanese male students in the FI/D cognitive styles. As presented in Table 21, the standard deviation of GEFT scores for Japanese male students ($s = 4.12$)

is higher than that of Japanese female students (s = 3.34). However, no significant differences were found. Thus, Hypothesis C-2 is rejected.

As presented in Table 22, among white-American students, the standard deviation of male students (s = 4.82) is higher than that of female students (s = 4.69). However, no significant differences were found. Thus, Hypothesis C-2 is rejected for the two groups.

Hypothesis C-3:

The hypothesis stated that the positive relationship between GEFT scores and math course grades among Japanese male students is significantly greater than that among Japanese female students.

The hypothesis was tested by the use of the Spearman Correlations. As presented in Tables 23 and 24, the results show that there are no significant correlations between GEFT scores and math course grades for Japanese male or female students although the correlation for Japanese males (r = 0.442) is higher than that for females (r = -0.066). The difference is not significant. Thus, Hypothesis C-3 is rejected.

The data also indicate the correlation between GPA and subject matters. GPA is significantly related to English (p = .025, r = 0.623) among Japanese male students, while GPA is significantly related to math (p = .025, r = 0.685) and

English (p = .05, r = 0.567) among Japanese female students. Another distinctive characteristic is that a significant relationship between math and English (p =.025, r = 0.713) exists among Japanese female students, but no significant correlation exists among Japanese male students.

TABLE 23: Spearman Correlations between GEFT Scores and GPA, Math, and English Course Grades among Japanese Male Students

	GEFT	GPA	MATH
GPA	-0.173		
MATH	0.442	0.431	
ENGLISH	-0.105	0.623**	0.129

** = p = .025

TABLE 24: Spearman Correlations between GEFT Scores and GPA, Math, and English Course Grades among Japanese Female Students

	GEFT	GPA	MATH
GPA	0.111		
MATH	-0.066	0.685**	
ENGLISH	-0.074	0.567*	0.713**

** p = .025
* p = .05

Furthermore, as presented in Tables 25 and 26, among white-American students, significant correlations were found between GEFT scores and GPA ($p = .005$, $r = 0.420$), math ($p = .025$, $r = 0.369$), and English ($p = .05$, $r = 0.283$) among male students, but no significant correlations were found among female students. This finding is different from Japanese students.

TABLE 25: Spearman Correlations between GEFT Scores and GPA, Math, and English Course Grades among White-American Male Students

	GEFT	GPA	MATH
GPA	0.420 ****		
MATH	0.369 **	0.796 ****	
ENGLISH	0.283 *	0.728 ****	0.571 ****

**** p = .005
** p = .025
* p = .05

Comparing white-American male and female students, there are similarities in the relationship between GPA and subject matters. However, the relationship between the variables for males is statistically more significant and stronger than for females.

TABLE 26: Spearman Correlations between GEFT Scores and GPA, Math, and English Course Grades among White-American Female Students

	GEFT	GPA	MATH
GPA	-0.163		
MATH	-0.165	0.651***	
ENGLISH	-0.193	0.695***	0.422*

*** p = .01
* p = .05

For further analysis, differences between GEFT scores, GPA, math, and English were compared by the use of the one-tailed t-test. Figure 3 illustrates the distribution of GEFT scores for Japanese male and female students. As presented in Table 27, no significant gender differences were found in GEFT scores. However, a significant gender difference was found in the means of GPA (p = .0009), math (p = .057), and English (p = .0013). The high GPA (X = 3.630) and low standard deviation scores of GPA (s = 0.289) for Japanese female students indicate that most of Japanese female students in American high schools are top students.

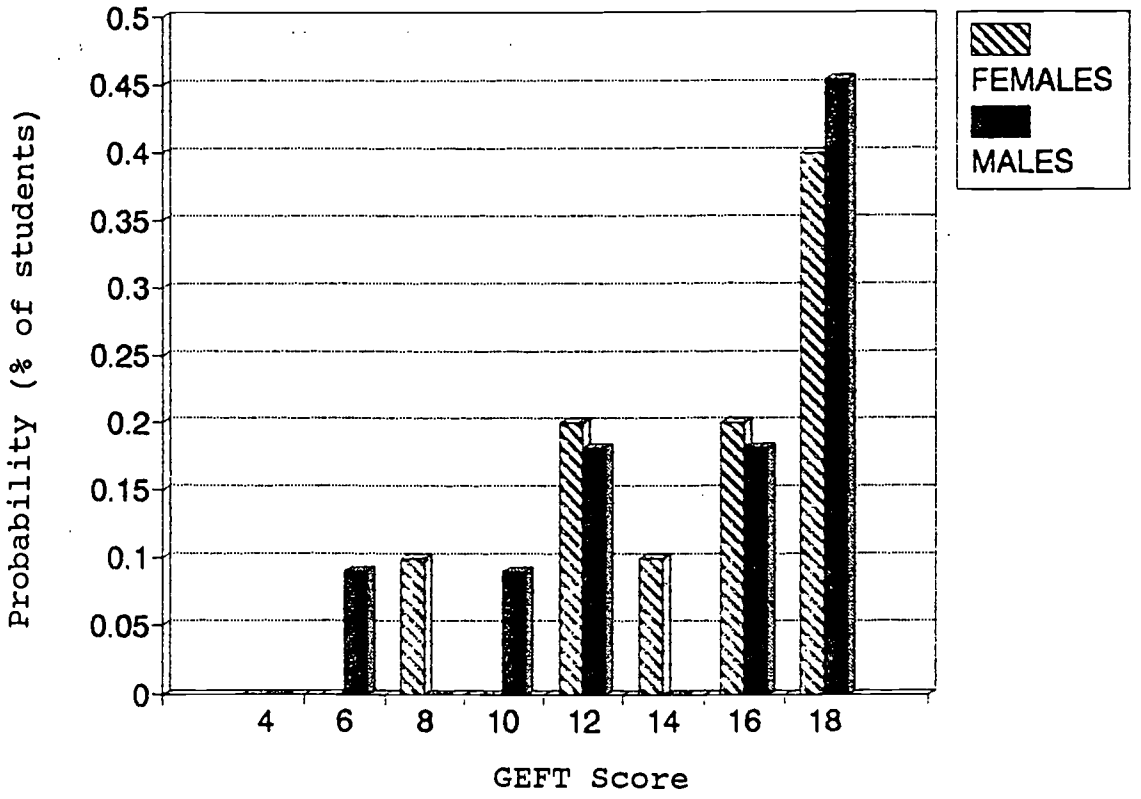

FIGURE 3: GEFT Scores of Japanese Male and Female Students

Figure 4 illustrates the distribution of GEFT scores for white-American students. As with the Japanese students (Figure 3), no gender differences were found. However, as presented in Table 28 among white-American students a significant difference was found in the means of GPA ($p = .036$) and English ($p = .032$). The standard deviations of all variables are higher for males than for females. However, since the data are insufficient, no significant difference was calculated.

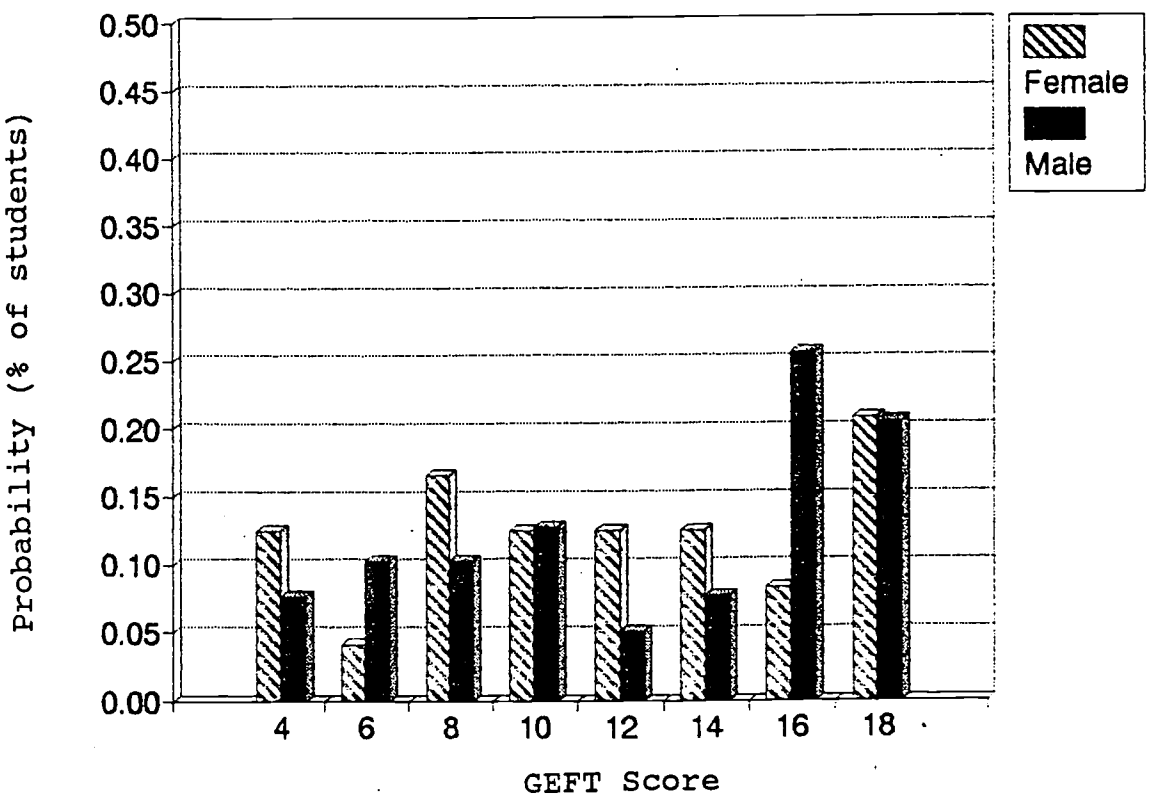

FIGURE 4: GEFT Scores of White-American Male and Female Students

TABLE 27: Means and Standard Deviations of GEFT Scores, GPA, Math, and English Course Grades for Japanese Male and Female Students

	GENDER	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
GEFT	M	11	14.18	4.12	19	1.729	-0.13	NS
	F	10	14.40	3.34				
GPA	M	11	2.935	0.481	19	1.729	-4.05	.0009
	F	10	3.630	0.289				
MATH	M	11	3.000	0.894	19	1.729	-2.04	.05
	F	10	3.700	0.675				
ENGL.	M	11	2.182	0.874	19	1.729	-3.81	.0013
	F	10	3.500	0.707				

TABLE 28: Means and Standard Deviations of GEFT Scores, GPA, Math, and English Course Grades for White-American Male and Female Students

GENDER		N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
GEFT	M	39	12.00	4.82	61	1.671	0.64	NS
	F	24	11.21	4.69				
GPA	M	39	3.045	0.620	61	1.671	-2.14	.036
	F	24	3.351	0.501				
MATH	M	39	2.77	1.13	61	1.671	-1.00	NS
	F	24	3.042	0.999				
ENGL.	M	39	2.67	1.03	61	1.671	-2.20	.032
	F	24	3.167	0.761				

In order to test Hypothesis C-3, differences of means of GEFT, GPA, math, and English scores were compared between

males and females in the two groups.

As presented in Table 29, a significant difference in GEFT scores (p =.035) was found among females, while no differences were found among males.

TABLE 29: Means and Standard Deviations of GEFT Scores for Japanese and White-American Male and Female Students

GENDER		N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J	M	11	14.18	4.12	48	1.676	1.49	NS
W-A	M	39	12.00	4.83				
J	F	10	14.40	3.34	32	1.697	2.24	.035
W-A	F	24	11.21	4.69				

As presented in Table 30, a significant difference (p =.05) in GPA was found between females in the two groups (Japanese females score higher), while no differences were found between males.

In addition, as presented in Table 31, in math course grades, a significant difference was found between females (Japanese are higher), while no differences were found between males.

TABLE 30: Means and Standard Deviations of GPA for Japanese and White-American Male and Female Students

GENDER	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J M	11	2.935	0.481	48	1.676	-0.63	NS
W-A M	39	3.045	0.620				
J F	10	3.630	0.289	32	1.697	2.04	.05
W-A F	24	3.351	0.501				

TABLE 31: Means and Standard Deviations of Math Course Grades for Japanese and White-American Male and Female Students

GENDER	N	MEAN	STDEV	DF	T/CRIT	T / A C T	SIG.
J M	11	3.000	0.894	48	1.676	0.71	NS
W-A M	39	2.77	1.13				
J F	10	3.700	0.675	32	1.697	2.23	.035
W-A F	24	3.042	0.999				

As presented in Table 32, no significant differences were found in English scores among male or female groups.

Furthermore, combining all variables, no difference was found between males in the two groups, while Japanese females score significantly higher than white-American females in GEFT ($p = .035$), GPA ($p = .05$), and math course grades ($p = .035$).

TABLE 32: Means and Standard Deviations of English Course Grade for Japanese and White-American Male and Female Students

GENDER		N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
J	M	11	2.182	0.874	48	1.676	-1.56	NS
W-A	M	39	2.67	1.03				
J	F	10	3.500	0.707	32	1.697	1.22	NS
W-A	F	24	3.167	0.761				

5. Hypothesis D

The fourth hypothesis stated that there are no significant, positive relationships between GEFT scores of Japanese students and number of years in American schools.

Table 33 illustrates raw GEFT scores, number of years in American schools, and ESL participation of Japanese students. This shows that more years in American schools did not improve GEFT scores or English proficiency in this study.

TABLE 33: Raw GEFT scores, number of years in American Schools and ESL Participation of Japanese Students

SUBJECTS	GENDER	GEFT SCORES	NO. OF YEARS IN AMERICAN SCHOOLS	ESL
01	M	18	0.83	YES
02	F	18	1.83	YES
03	F	17	2.5	NO
04	M	17	3.5	NO
05	M	17	5.42	NO
06	M	17	1.83	YES
07	F	17	2.92	YES
08	M	17	5.42	NO
09	F	17	0.5	YES
10	M	16	5.92	NO
11	F	16	2.75	YES
12	M	16	2.42	YES
13	F	15	4.67	NO
14	F	14	4.75	NO
15	M	12	5.92	NO
16	F	11	0.5	YES
17	M	11	0.92	YES
18	F	11	2.92	YES
19	M	10	0.5	YES
20	F	8	1.00	NO
21	M	5	3.92	YES

N = 21	GEFT X = 14.29	S.D = 3.68	YEARS X = 2.90	ESL = 12
M = 11	GEFT X = 14.18	S.D.= 4.12	YEARS X = 3.33	ESL = 6
F = 10	GEFT X = 14.40	S.D.= 3.34	YEARS X = 2.43	ESL = 6

As presented in Table 34, the results of the Spearman correlations show that no significant relationships exists between GEFT scores and number of years in American schools. This may indicate that FI and number of years in American schools are not related.

TABLE 34: Spearman Correlations between GEFT and GPA, Math, English and Number of Years in American Schools among Japanese Students

	GEFT	GPA	MATH	ENGLISH
GPA	-0.119			
MATH	0.198	0.710 ****		
ENGLISH	-0.064	0.804 ****	0.594 ****	
NUMBER OF YEARS IN AMERICAN SCHOOLS	0.030	0.102	0.150	0.121

**** p = .005

Comparing the mean number of years in American schools between Japanese male and female students, the one-tailed t-test was used. As shown in Table 35, there are no gender differences in the mean of number of years in American schools.

TABLE 35: Means and Standard Deviations of Number of Years in American Schools for Japanese Male and Female Students

GENDER	N	MEAN	STDEV	DF	T/CRIT	T/ACT	SIG.
M	11	2.43	1.52	19	1.729	-1.11	NS
F	10	3.33	2.14				

As presented in Tables 36 and 37, no correlations were found between GEFT and number of years in American schools for Japanese male and female students. However, a gender difference was found in the cross-correlations. As shown in Table 36, a strong, but not significant relationship was found between number of years in American schools and GPA (r = 0.411) and English (r = 0.489) among male students. As shown in Table 37, a strong, but not significant relationship was found between number of years in American schools and math course grades (r = 0.500) among female students. This may indicate that for Japanese male students GPA and English course grades are associated with number of years in American schools and that for Japanese females math course grades are associated with number of years in American schools.

TABLE 36: Spearman Correlations between GEFT Scores and GPA, Math, English, and Number of Years in American Schools among Japanese Male Students

	GEFT	GPA	MATH	ENGLISH
GPA	-0.173			
MATH	0.442	0.431**		
ENGLISH	-0.105	0.623	0.129	
NUMBER OF YEARS IN AMERICAN SCHOOLS	0.007	0.411	0.023	0.489

** p = .025

TABLE 37: Spearman Correlations between GEFT Scores and GPA, Math, English, and Number of Years in American Schools among Japanese Female Students

	GEFT	GPA	MATH	ENGLISH
GPA	0.111			
MATH	-0.666 **	0.685 **		
ENGLISH	-0.074	0.567 *	0.713 **	
NUMBER OF YEARS IN AMERICAN SCHOOLS	-0.050	0.095	0.500	0.049

** p = .025
* p = .05

CHAPTER V. DISCUSSION

1. Discussion

Results of Hypothesis A show that cognitive styles of Japanese students are highly FI. This finding is supported by previous research (Kato, 1965; DeVos, 1980). A number of studies found that more students from low socioeconomic family backgrounds, minority students, and women tend to be FD and that their FD cognitive styles relate to their academic achievement (Cohen, 1969; Ramirez and Castaneda, 1974; Ogbu, 1982, 1983, 1987a, b; Saracho, 1983; Banks, 1988). The majority of Japanese students in this study are from middle-class family backgrounds, although they are language minority students. Middle-class groups are more analytic, reflective, and FI (Kagan & Kogan, 1970; Sigel, 1971). Japanese socioeconomic statuses are very similar to those of white-American students. Thus, the results seem to indicate that FI significantly relates to socioeconomic status. The FI cognitive style of white-American students supports this finding. Although Japanese society is hierarchical and reinforces social conformity, Japanese social-value orientations such as competition distinguishes Japanese from other minority groups in the FI/D cognitive styles.

However, the study also found that the mean GEFT score of Japanese students is significantly higher ($p = .013$) than those of white-American students. This may indicate that FI

relates to other factors. The Japanese education system, which reflects Japanese society, is also highly competitive. Especially, high school students have to compete with peers in college entrance examinations. This competition may be associated with the FI cognitive style of Japanese students. Since Japanese education at the high school level emphasizes more FI, FI students have an advantage in learning and academic achievement. This trend prevails in Western education (Shade, 1982). Another factor is Japanese culture. Very strong ego boundaries are established in socialization and child-rearing, and as a result, there is a high degree of internality among Japanese (DeVos, 1980). Japanese culture highly values a sense of separation from others, but not individualism. Thus, this cultural value may be associated with the high FI cognitive style of Japanese students. These factors may explain why Japanese students score significantly higher than white-American students on the GEFT.

No significant, positive correlations between GEFT scores and GPA, math, or English course grades were found among the two groups as investigated in Hypothesis B-1. This implies that FI and academic achievement as measured by GPA (including math and English achievement) are not related. However, significant correlations ($p = .005$) were found between GPA and subject matter for the two groups. A significant correlation of GPA with math ($p = .005$, $r = 0.710$) and with English ($p = .005$, $r = 0.804$) was found among Japanese. A significant

correlation of GPA with math ($p = .005$, $r = 0.740$) and with English ($p = .005$, $r = 0.735$) was found among white-Americans. In addition, a significant correlation between math and English ($p = .005$, $r = 0.594$) was found among Japanese. Similar results were found ($p = .005$, $r = 0.512$) among white-Americans. This implies that math and English course grades are appropriate predictors of over-all academic achievement for the two groups. The only significant difference between the two groups is that Japanese students achieve significantly higher math scores ($p = .05$) than white-Americans.

A significant correlation ($p = .05$) between GEFT and MAT math scores ($r = 0.231$) was found among white-Americans as investigated in Hypothesis B-2. This implies that FI and math achievement are related. However, the MAT test data were not available for Japanese students. Thus, this hypothesis was not tested among Japanese.

A significant negative correlation ($p = .05$) was found between GEFT and Competence Test reading scores ($r = -0.439$) among Japanese as investigated in Hypothesis B-3. Since only a few students took this test, it is difficult to determine whether FI relates to Competence Test math and reading scores. In addition, the Competence Test math is a computation test; it may not measure analytical ability. Thus, it is apparent that the Competence Test is not an appropriate predictor of academic achievement for either Japanese or white-American students.

No significant gender differences in GEFT scores were found in the two groups as investigated in Hypothesis C-1. This implies that the FI cognitive styles of males and females are similar within each ethnic group. However, in reviewing the entire sample, Japanese females score the highest. This indicates that Japanese females are most FI among all groups. This result is contrary to the previous research on males versus females in the United States (Witkin, 1967). This seems to indicate that Japanese male and female students who have come to the United States are different from those in Japan. It is possible that since the Japanese education system is highly competitive, high school students, especially senior male students, tend to stay in Japan to prepare for college entrance examinations. In contrast, Japanese female students who have come to the States tend to stay longer to enter American universities. This tendency may relate to the high FI cognitive style of Japanese females in this study.

A strong (but not significant) gender difference was found in the standard deviation as investigated in Hypothesis C-2. The standard deviation of Japanese males ($s = 4.12$) is higher than Japanese females ($s = 3.34$). This finding is also contrary to the hypothesis and previous research (Witkin & Berry, 1975). However, since data are insufficient, significant differences cannot be stated.

Significant gender and cultural differences were found in the relationships between GEFT scores and GPA, math, and

English in the two groups as investigated in Hypothesis C-3. Significant correlations between GEFT and GPA ($p = .005$, $r = 0.420$), math ($p = .025$, $r = 0.369$), and English course grades ($p = .05$, $r = 0.283$) were found among white-American male students, while no significant correlations were found among either Japanese males or females in the two ethnic groups. This implies that GEFT may be an appropriate predictor of academic achievement only for white-male Americans, but not for white-female students or students from Japan.

In addition, significant gender and cultural differences in the achievement patterns were found. A significant correlation ($p = .025$) between GPA and English ($r = 0.623$) among Japanese males indicates that their GPA is more a reflection of their English rather than math course grades. Significant correlations between GPA and math ($p = .025$, $r = 0.685$) and English ($p = .05$, $r = 0.567$) and between math and English ($p = .025$, $r = 0.713$) for Japanese females show that their GPA is more a reflection of their math and English course grades. In contrast, among white-Americans different achievement patterns were found. Significant correlations ($p = .005$) between GPA and math ($r = 0.796$) and English ($r = 0.728$) and between math and English ($r = 0.571$) among White-American males indicate that all subject matters are strongly related to GPA. Significant correlations between GPA and math ($p = .01$, $r = 0.651$) and English ($p = .01$, $r = 0.695$) and between math and English ($p = .05$, $r = 0.422$) among white-

American females indicate that GPA is a reflection of both math and English with less strong correlation than white-American males.

The difference in means of Japanese students by gender is greater than that of white-Americans. Among males in the two groups, no significant difference was found, while significant differences were found in GEFT ($p = .035$), GPA ($p = .05$), and math ($p = .035$) among females in the two groups. Because of the college entrance examination, Japanese high school students, especially male students, tend to stay in Japan or go back home before the senior year if they come to the United States. It is possible that excellent Japanese male students tend to stay in Japan and that Japanese females thus do better than Japanese males in the States.

No significant correlation was found between GEFT scores and number of years in American schools among Japanese students (total, male, and female) as investigated in Hypothesis D. This seems to indicate FI is not related to English (verbal) abilities, because the FI/D cognitive styles are consistent and stable in each cultural group (Witkin, 1967). Or it is possible to say that since Japanese females are high GEFT and English scorers, their cognitive styles may be FI in Japan with high English achievement and that they maintain their FI with no language handicaps in the States.

However, a strong (but not significant) gender difference was found among Japanese students in the States. Number of

years in American schools relates more to GPA (r = 0.411) and English (r = 0.489) among Japanese males. In contrast, number of years in American schools relates more to math (r = 0.500) among Japanese females.

These findings imply that the FI cognitive style is strongly associated with gender and culture differences. In addition, the differences in GEFT, GPA, math, and English course grades in academic achievement are also associated with gender and culture differences.

2. Conclusion

The results show that cognitive styles of Japanese students are highly FI, and Japanese students are significantly more FI (p = .013) than white-American students. Both groups are from middle-class family backgrounds in which analysis, reflection, and FI are emphasized (Kagan & Kogan, 1970; Sigel, 1971). Thus, FI may strongly relate to socioeconomic status. In addition, Western education emphasizes more FI (Shade, 1982). Japanese education, especially the Japanese college entrance examination system, also reinforces more FI for Japanese high school students. Thus, FI may relate to competition in Western and Japanese education. The high FI cognitive style of Japanese students may also relate to Japanese culture. A great deal of internality among Japanese as a part of Japanese social-value orientation (DeVos, 1980) may be associated with the high FI

cognitive style of Japanese students in the United States.

No significant correlations for Japanese students were found between GEFT and GPA, math, English, Competence math, or reading scores. This implies that FI does not relate to academic achievement. However, a significant correlation was found between GEFT scores and MAT math for white-Americans ($p = .05$, $r = 0.231$) and between GEFT and GPA ($p = .005$, $r = 0.420$), math ($p = .05$, $r = 0.369$), and English ($p = .05$, $r = 0.283$) for white-American males. This may indicate that GEFT and MAT are appropriate predictors of academic achievement for white-American males. GEFT and MAT seem to be white-American middle-class-dominated predictors; those predictors thus may not reflect either cognitive styles or academic achievement of females and Japanese. Furthermore, the Competence Test is not an appropriate predictor of academic achievement for the two groups, because no significant correlation was found even among white-Americans.

Significant differences were found between the two ethnic groups by gender in the achievement patterns in GPA, math, and English course grades. Japanese females score significantly higher than males in GPA ($p = .0009$), math ($p = .05$), and English ($p = .0013$), while white-American females scores significantly higher than males in GPA ($p = .036$) and English ($p = .032$). No significant difference was found between males in any variables, while Japanese females score higher than white-American females in GPA ($p = .05$) and math course grades

($p = .035$) as well as GEFT ($p = .035$).

No significant correlation between GEFT and number of years in American schools was found among Japanese students (total, male, and female). This implies that FI and English proficiency are not related, or if related, then Japanese students may have already had English proficiency when they arrived in the United States.

Thus, these findings may lead to the conclusion that gender and culture differences exist in FI cognitive style and academic achievement. Although no significant correlations were found between FI and academic achievement, the results show that culture differences in the FI cognitive style exist between Japanese and white-American students who have similar socioeconomic status. Furthermore, the results show that gender and cultural differences in the achievement patterns exist between the two groups. High FI and high math achievement of Japanese students implies that FI may relate to analytical ability in math. Significantly high FI and high GPA, math, and English achievement of Japanese females implies that FI may relate to some aspects of verbal ability. Furthermore, this may also relate to analytical ability, because a significant correlation ($p = .025$, $r = 0.713$) exists between math and English among Japanese females.

Finally, the results of this study suggest that it would be beneficial for educators in the United States to reexamine the FI cognitive styles of their students and develop

instructional strategies based on those styles for language minority students who do not do well in school.

3. Recommendations

For future studies, the following recommendations can be made:

(a) Sample

In this study, Japanese and white-American students in American high schools were compared. In order to examine culture differences in the FI cognitive styles between the two groups, Japanese students in Japan should be compared to white-American students. Another extended study can be done in comparing different age groups among Japanese students in American schools, because there are significant age differences in the FI/D cognitive styles. In addition, there is a consistency in perceptual functioning and relative stability of the level of psychological differentiation during development, especially in young adulthood (Witkin et al., 1967; Kogan, 1973).

In addition, collecting equal numbers of male and female students in larger samples would produce more accurate data.

(b) Measurement of the F/D Cognitive Styles

In this study, GEFT scores were used as a measure of the FI/D cognitive styles. However, GEFT scores may be an instrument only for measuring analytical skills. In addition, GEFT may be an appropriate predictor only for white-American

students. Thus, other context-free instruments should be used or several instruments should be used for measuring different skills relating to FI in future studies.

Furthermore, in administration of the GEFT, speed of test performance should be measured as well as content. Even though students have answered correctly, individual differences may exist in speed of taking a test.

(c) Measurement of Academic Achievement

In this study, GPA, MAT, and Competence Test scores were used as the measures of academic achievement. For further studies, ESL proficiency test data should be used for Japanese students in order to examine the relationship between FI and English (verbal) ability. In addition, the levels of math classes should be analyzed in order to measure the correlation between FI and math achievement.

(d) Relationship between FI and Academic Achievement

In this study, socioeconomic status was held constant. However, no detailed explanations were provided as to why cognitive styles of Japanese students are higher than white-American students. Thus, future studies should be extended in analyzing social stratification, competition, and internalization of ego that may relate to the high FI cognitive styles of Japanese students.

(e) Instructional Implications

Results of this study show that FI students do well in school. Thus, future studies should develop teaching strategies that show how to use the FI cognitive style in classrooms (especially in math classes).

However, it is also important to develop teaching strategies based on the FD cognitive style so that FD students may learn maximally, and build up their self-esteem without having to modify their cognitive style. This would be a more democratic way of teaching and learning, would increase two-way communication between teachers and students, and would assure greater contribution to society by FD individuals.

GLOSSARY

BODY-ADJUSTMENT TEST (BAT): A perceptual test which measures whether the subject can adjust the tilt of his chair to the true vertical position, while looking into a small tilted room.

BREADTH OF CATEGORIZING: Range of inclusiveness in establishing the limits of categories. Broad categorizers will include many items and reduce the risk of exclusion. Narrow categorizers prefer to exclude item and reduce the risk of including an item which may not belong.

CHILDREN'S EMBEDDED FIGURES TEST (CEFT): The children's version of the EFT used with children in the 5-to-9 year age range.

CONCEPTUALIZING STYLE: A psychological dimension that assesses a person's tendency to form groupings of objects based on physical similarity versus functional relationships between objects.

COGNITIVE STYLES: The characteristic self-consistent modes of functioning found pervasively throughout an individual's cognition, that is, perceptual and intellectual abilities.

COGNITIVELY COMPLEX: A tendency to perceive diversity and conflict.

COGNITIVELY SIMPLE: A tendency to perceive similarities.

COMPETENCE TEST: A local district-wide basic skills test which measures minimum competency in math, reading, and writing needed for graduation.

DISTRACTIBILITY: Susceptibility to distraction. Flexible individuals can concentrate on the task at hand without attending to interfering stimuli.

EMBEDDED FIGURES TEST (EFT): A perceptual, speed test that requires the subject to outline a simple geometric shape within a complex design. The subject must locate or separate the relevant information from the contextual field and restructure it to design the correct shape.

ENGLISH AS A SECOND LANGUAGE (ESL): A district program which provides English language instruction to limited English proficient students in order to prepare those students for meaningful participation in mainstream classes.

FIELD-DEPENDENCE (FD): A tendency to rely on external frames of reference in cognitive activities and is thought to foster skills in interpersonal relations.

FIELD-INDEPENDENCE/DEPENDENCE (FI/D): Individual differences in preferred ways of perceiving, organizing, analyzing, or recalling information and experience.

FIELD-INDEPENDENCE (FI): A tendency to rely on internal rules or strategies for processing information and the existence of mental restructuring abilities.

GLOBAL: A tendency to focus on the relationship of items to their background; it reflects a lack of ability to separate target from context but a strong sensitivity to environmental cues.

GRADE-POINT-AVERAGE (GPA): A measure of academic achievement which is indicated by four levels; A = 4, B = 3, C = 2, and D = 1.

IMPULSIVE: A tendency to respond quickly with the first answer that occurs even though it may be wrong.

JAPANESE STUDENTS: Students who were born in Japan and registered as Japanese citizen at the school registration.

LANGUAGE-MINORITY STUDENTS: Students who used a non-English language as their usual or second household language.

LEARNING STYLES: The way in which each person absorbs and retains information and/or skills, regardless of how that process is described, it is dramatically different for each person.

LEVELER: The individuals who tend to assimilate new stimuli with familiar elements and at extremes over-generalize.

METROPOLITAN ACHIEVEMENT TEST (MAT): An achievement test which measures achievement in math, reading, and language arts at grades K through twelve.

PSYCHOLOGICAL DIFFERENTIATION: The complexity of an individual's psychological system's structure in which specialization means a degree of separation of psychological areas, as feeling from perceiving, thinking from acting.

REFLECTIVE: A tendency to consider information is processed.

ROD-AND-FRAME TEST (RFT): A perceptual test which measures whether the subject can adjust the rod seen within a rectangular frame, each tilted away from the true vertical, until it seems to him to be vertical.

SCANNING: Extensiveness and intensity of attention. Individuals' styles may be to scan the entire field or to focus on selected elements in it.

SHARPENER: The individuals who at extremes tend to over-discriminate.

SCHOLASTIC APTITUDE TEST (SAT): An aptitude test which measures developed verbal and mathematical reasoning abilities and to help college in assessing the prospective academic achievement of students.

SPEARMAN CORRELATION COEFFICIENTS: Those are used when ranks are available on each of two variables for all subject. Ranks are simply listings of scores from highest to lowest. The Spearman correlation shows the degree to which subjects maintain the same relative position on two measures.

STANDARDIZED TESTS: Tests that are administered and scored according to highly structured, prescribed directions.

VERBAL ABILITY: Intellectual capabilities needed for communication such as speaking, listening, reading, and writing.

WECHSLER ADULT INTELLIGENCE SCALE (WAIS): A test designated for use with adults aged 16 to 74 and was to assess aspects of intelligence which currently are quantifiable.

WECHSLER INTELLIGENCE SCALE FOR CHILDREN (WISC): A test designed for use with children up to 16 and was designed to assess those aspects of intelligence which currently are quantifiable.

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APPENDIX A : LETTERS

2201 A Street
Bellingham, WA 98225

January 13, 1992

Dear parents,

I wish to request the participation of your son/daughter in an important research project on learning styles.

My name is Setsuko Buckley. I am a doctoral candidate at the University of Washington. I will be studying Japanese students who are temporarily living in the United States, primarily with their families due to their parents job assignment, and comparing them with the rest of the American students in Bellevue. Specifically, I will be studyiong the cognitive styles of Japanese students and how this may relate to their academic achievement in American high schools, and comparing this to the achievmetn of the rest of the American students.

Although the results of this study will be given to the Bellevue School District to assist them in dealing with the diversity of their student population, all information about specific students will remain strictly confidential.

Enclosed please find a consent form. Please read it carefully and if you agree to support this project sign and return it.

I would be grateful if you would return it with both your own and your child's signatures by February 1, 1992. Please use the stamped, self-addressed envelope enclosed for your convenience.

If you have any questions, please feel free to contact me. My phone numbers are (206) 647-4857 (W) or (206) 676-4123 (H) in Bellingham.

Thank you very much in advance.

Sincerely,

Setsuko Buckley

Setsuko Buckley

御父兄及び保護者各位

此の度学習態度に関する重要なリサーチプロジェクトにぜひお子様の御参加をお願いしたいと存じます。

私はワシントン大学の博士課程に在籍しております セツコ・バックレーと申します。このプロジェクトは主に御両親の御仕事のために、米国に滞在している日本人高校生を対象にし、ベルビューの他のアメリカ人の生徒と比較するものです。特にこのプロジェクトは日本人高校生の学習態度が米国の高校における学業成績とどのように関係があるかをさぐり、他のアメリカ人の生徒との成績を比較するねらいをもっております。

このプロジェクトの結果は、ベルビュー学校郡に提出され、様々な文化背景をもった生徒グループの教育に役立てる予定ですが、生徒個人に関するすべてのインフォーメーションは全く公表されません。

このプロジェクトのための承諾書を同封致しますのでよくお読みください。このプロジェクトを支持することに同意された場合は承諾書にサインをお願い致します。

2月1日までに御父あるいは保護者とお子様のサインを伴った承諾書をお送りくだされるようお願い申し上げます。便宜上同封しました返信用封筒をお使いください。

もし御質問がありましたらぜひ下記の電話番号までお問い合わせください。私の電話番号はベリンハムの(206)647-4857(勤務先)、(206)676-4123(自宅)です。

ありがとうございました。

セツコ・バックレー

1992年 1月 13日

APPENDIX B : CONSENT FORM

CONSENT FORM

A STUDY OF FIELD-INDEPENDENT/FIELD-DEPENDENT COGNITIVE STYLES OF JAPANESE STUDENTS AND CORRELATIONS WITH ACADEMIC ACHIEVEMENT IN TWO AMERICAN HIGH SCHOOLS

Setsuko Buckley
Ed. D. Student, Curriculum and Instruction
The University of Washington

2201 A Street, Bellingham, WA 98225
(206) 647-4857 (W), (206) 676-4123 (H)

Investigator's statement:

PURPOSE AND BENEFITS

I have chosen to conduct this study in partial fulfillment of the requirements for a graduate degree in Education.

The purpose of the study is 1) to identify cognitive styles as measured by field independence/dependence - (FI/D) of Japanese students in American high schools; 2) to investigate the relationship of their cognitive styles to their academic achievement, sex differences, and number of years in American schooling; and 3) to examine if there is any cross-correlation between the above variables.

This study will provide a possible cultural explanation of the degree to which Japanese students' academic achievement may be dependent on their cognitive styles. Furthermore, it will provide educators with information on how cognitive styles interact with instructional styles, methods, and environments to affect academic achievement.

PROCEDURES

Selection of schools and subjects:

Two high schools (the ninth through twelfth grades) in a suburban middle-class city have been selected. Subjects will be all Japanese-born students and 60 White-American students randomly chosen from these schools.

Measures of cognitive styles

The subjects will be measured on the FI/D dimension by the use of the Group Embedded Figures Test (GEFT). Test scores will assess the degree to which Japanese students tend to be field independent or field dependent.

Measure of academic achievement:

Academic achievement of the subject will be measured by the use of GPA, MAT, and Competency Test scores. These data will be obtained from cumulative students' records with permission of the subject.

Duration of the study: January 13 - June 15, 1992

RISKS, STRESS, AND DISCOMFORT

The actual time of the test is twenty minutes. The test that assesses subjects' analytical skills may cause minimal stress.

OTHER INFORMATION

All data will be confidential and only the investigator will have access to identifiable data. The data will only be used in order to identify FI/D cognitive styles of Japanese students and correlations with their academic achievement. The written report of the results of the study will be placed in the thesis section of the University of Washington Library. The data will be retained until August 31, 1992.

Setsuko Buckley

Signature of Investigator Date

Subject's statement:

"The study described above has been explained to me. I voluntarily consent to participate in this activity. I have had an opportunity to ask questions. I understand the future questions I may have about the research or about my rights as subject will be answered by the investigator listed above. I understand that I may withdraw my child at any time without penalty or loss at benefits to which s/he is otherwise entitled."

Signature of subject Date

Signature of parent or legal guardian Date

cc: Investigator
Parent

ワシントン大学 教育学部

承諾書

「米国の二高校における日本人生徒の学習習得態度（学習環境から独立あるいは依存しているかに関する学習習得態度）と学業成績との相互関係に関する研究」

ワシントン大学
教育学部 教科課程／教育学科 博士課程
セツコ・バックレー

研究者の陳述

目的と受益

この研究は教育学の博士号取得においてその必須条件の一部を満たすために行なわれるものです。この研究の目的は1)米国の高校で学んでいる日本人生徒がどのような学習習得態度（学習環境から独立あるいは依存しているかに関する）であるかを明らかにすること 2)彼らの学習習得態度が学業成績、性別の差、米国教育システムにおける学習経験年数とどのような関係があるかを調査すること 3)上記した変数の間で相互関係があるかを調査することにあります。

この研究は、日本人生徒の学業成績が彼らの学習習得態度にどの程度依存しているかについて文化的背景をもとにした説明を与えることを可能にするでしょう。さらにこの研究は学習習得態度が学業成績に影響を及ぼすであろう教師の態度、教え方、学習環境にどのように作用しているかということについて教育にたずさわっている方々に情報を与えるでしょう。

研究方法

学校 対象者の選定

中級階級の家庭が散在する郊外の町に位置した二つの高校（学年 9年～12年）が選定されました。対象者は 日本で生まれたすべての生徒と、二高校から 無差別に選ばれた 60名の 白人アメリカ人の生徒です。

学習習得態度の測定

対象者の 学習習得態度は、グループ図形はめ込みテストを用いて、学習環境から、対象者の学習習得態度が 独立しているか 依存しているかに 関して、測定されます。テストの点数は、その態度の傾向の度合を示します。

学業成績の測定

対象者の 学業成績は 平均年級成績 メトロポリタン・アチーブメント テスト 能力テストの 点数によって 測定されます。これらのデータは、対象者の許可を得て、累積成績記録ファイルから 取得されます。

研究期間　1992年1月13日～6月15日

危険度、ストレス、不快感について

グループ図形はめ込みテストの 実施時間は 20分間です。このテストは 対象者の 分析力を測定するもので ストレスは ほとんど ありません。

その他の情報

すべてのデータは一切公表されず、研究者だけが、元のデータに触れることができます。データは、日本人生徒の学習習得態度が、学習環境から独立しているか依存しているかを見きわめ、その態度が彼らの学業成績とどのように関係があるかを調査するためにのみ用いられます。
研究結果の報告書はワシントン大学図書館の論文セクションに保存されデータは1992年8月31日まで研究者によって保管されます。

研究者の署名　　日付

対象者の陳述

「私は、上記の研究に関する陳述書を理解しました。私は、この研究活動に参加することに喜んで承諾します。この研究を始める前に、質問する機会がありますが、今後も、この研究、あるいは、対象者としての私の権利に関して、質問があれば、上記の研究者がその質問に答えられるというように理解しました。私は、この研究が私の子供に受容をもたらさないならば、いつでも子供にこの研究活動をやめさせてもよいというように理解しました。」

対象者(生徒)の署名　　日付

御父兄あるいは保護者の署名　　日付

コピー：研究者
御父兄

APPENDIX C : QUESTIONNAIRE

This project is designed to investigate how learning styles of Japanese, East Asian and American students may relate to their academic achievement in American high schools.

The purpose of this research is to identify the cognitive styles of three groups of students and to investigate the relationship between their cognitive styles and academic success. Thus, this study will be beneficial for both teachers and students in identifying successful teaching and learning strategies.

Your responses to the following initial questions are extremely important to begin this task. Please take a few moments to answer the questions seriously and carefully.

---

1) Name : _____

2) What is your ethnic background?

_____

3) If you are a foreigner or an immigrant, how long have you been enrolled in American schools since the first grade?

_____ _____
years months

5) Average GPA : _____

6) MAT score :

_____	_____	_____	_____
math	reading	language arts	total

7) Competence Test score :

_____	_____	_____
math	reading	writing

Thank you for taking your time to respond. Please return your questionnaire as quickly as possible.

APPENDIX D : GEFT SAMPLE

GROUP EMBEDDED FIGURES TEST

By Philip K. Oltman, Evelyn Raskin, & Herman A. Witkin

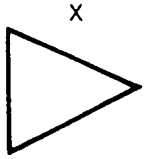
Name _____ Sex _____

Today's date _____ Birth date _____

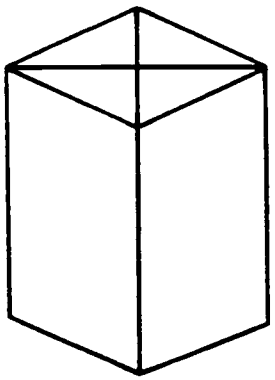
INSTRUCTIONS: This is a test of your ability to find a simple form when it is hidden within a complex pattern.

Here is a simple form which we have labeled "X":

X



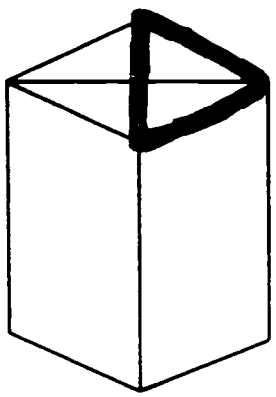
This simple form, named "X", is hidden within the more complex figure below:



Try to find the simple form in the complex figure and trace it *in pencil* directly over the lines of the complex figure. It is the SAME SIZE, in the SAME PROPORTIONS, and FACES IN THE SAME DIRECTION within the complex figure as when it appeared alone.

When you finish, turn the page to check your solution.

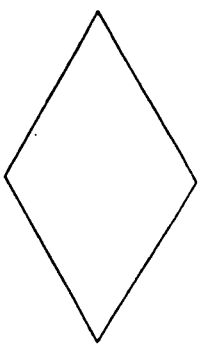
This is the correct solution, with the simple form traced over the lines of the complex figure:

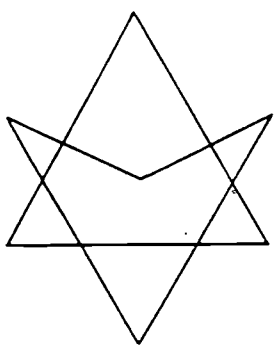


Note that the top right-hand triangle is the correct one: the top left-hand triangle is similar, but faces in the opposite direction and is therefore *not* correct.

Now try another practice problem. Find and trace the simple form named "Y" in the complex figure below it:

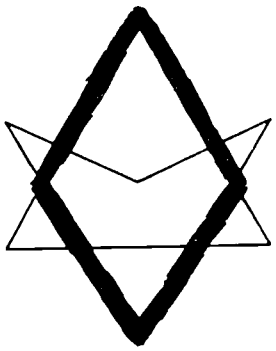
Y





Look at the next page to check your solution.

Solution:



In the following pages, problems like the ones above will appear. On each page you will see a complex figure, and under it will be a letter corresponding to the simple form which is hidden in it. For each problem, look at the BACK COVER of this booklet to see which simple form to find. Then try to trace it in pencil over the lines of the complex figure. Note these points:

1. Look back at the simple forms as often as necessary.

2. ERASE ALL MISTAKES.

3. Do the problems in order. Don't skip a problem unless you are absolutely "stuck" on it.

4. Trace ONLY ONE SIMPLE FORM IN EACH PROBLEM. You may see more than one, but just trace *one* of them.

5. The simple form is always present in the complex figure in the SAME SIZE, the SAME PROPORTIONS, and FACING IN THE SAME DIRECTION as it appears on the back cover of this booklet.

Do not turn the page until the signal is given

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